CHAPTER 2

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

This chapter describes Newmont's previous operations at the Leeville Project area, Newmont's Proposed Action to develop the Leeville Mine, and a range of reasonable alternatives to the Proposed Action. The proposal to develop ore reserves in multiple deposits located in the Leeville Project area is collectively referred to as the Leeville Project or the Proposed Action in this document.

Alternatives considered in the EIS are based on issues identified by the BLM and comments received during the public scoping process. Alternatives are developed in response to substantive issues identified during scoping and are intended to reduce or minimize potential impacts associated with the Proposed Action that are not being mitigated by Newmont (Chapter 2) or BLM (Chapter 4).

Detailed discussions of the following topics are presented in this chapter:

- History of mineral exploration and mining in the Carlin Trend and Leeville Project area;
- Newmont's previous activities in the Leeville Project area;
- Newmont's Proposed Action for the Leeville Project; and
- Alternatives to the Proposed Action, including the No Action Alternative and Alternatives Considered but Eliminated from Detailed Analysis.

HISTORY OF EXPLORATION AND MINING

The area of gold mine development in the vicinity of Carlin, Nevada is known as the Carlin Trend (**Figure 2-1**). The Carlin Trend is a linear sequence of gold deposits extending from approximately 10 miles southeast to approximately 40 miles northwest of Carlin. Although the area has been mined for the past 120 years, major mining activity began with development of the Carlin Pit in 1965.

GOLD MINERALIZATION

The following primary geologic occurrences have led to present-day gold mining in the Carlin Trend: 1) deposition and lithification of marine sediments that host the gold mineralization; 2) faulting that disrupted these rocks and created pathways for movement of mineralizing fluids and openings for deposition of gold; 3) deposition of gold from mineralizing fluids associated with igneous activity; and 4) surface erosion that exposed the mineralized rocks.

As gold-bearing fluids migrated upward along faults and fractures, they permeated the disrupted rocks throughout the area. This resulted in widespread dissemination of gold particles and sulfide minerals through large volumes of rock, creating large-tonnage, low-grade gold deposits known to geologists as "Carlin-type" ore bodies. Disseminated gold deposits are typically composed of submicron-sized gold particles often visible only with a scanning electron microscope. Over 20 ore deposits have been identified in the Carlin Trend since exploration for disseminated gold was initiated.

Geologic and mineralization processes have resulted in formation of two disseminated ore types in the Carlin Trend. The uppermost or near-surface ore type is known as oxide ore. This type of ore occurs at shallow depths where oxygenated water percolating through the subsurface has leached most sulfide minerals from the rock. The natural leaching process leaves gold in the rock but removes most of the sulfidic minerals.

A second ore type is unoxidized and typically occurs at greater depths at or below the water table where water is low in oxygen. Unoxidized ore is commonly rich in sulfides and can be refractory (i.e., difficult to treat for recovery of precious metals). Refractory ore is further broken down into two subclassifications: 1) silica-sulfide ore, in which gold is locked within sulfide and quartz minerals; and 2) carbon-sulfide ore, in which gold occurs with carbonaceous and sulfidic minerals. Refractory ore is not readily amenable to gold extraction through conventional cyanide leaching; additional processing is required to recover the gold.

MINING IN THE CARLIN TREND

Exploration activities in the Carlin Trend began in the early 1870s with staking of the Good Hope claims in the Maggie Creek district (Coope 1991). These claims produced mainly lead and silver, with minor amounts of barite and gold. The first significant gold discovery was made on Lynn Creek in 1907, approximately 1.5 miles north of the present Carlin Mine. Placer gold discoveries followed in Sheep, Rodeo, and Simon creeks (**Figure 2-1**).

Newmont initiated its mining activities in the North Operations Area at the Carlin open-pit mine in 1965. Newmont's North Operations Area includes all of Newmont's mining operations located between the Carlin and Bootstrap Mines. Mining at the Bootstrap open-pit mine began in 1974 and continued until 1984; closure and reclamation activities were completed in 1988. Newmont began mining at Blue Star in 1974, and at Genesis in 1986. In 1988, Newmont constructed and initiated operations at the Mill #4 process facilities and North Area Leach Facilities. In 1994, Newmont re-initiated mining at the Bootstrap open-pit mine, including the Capstone and Tara open-pit mines.

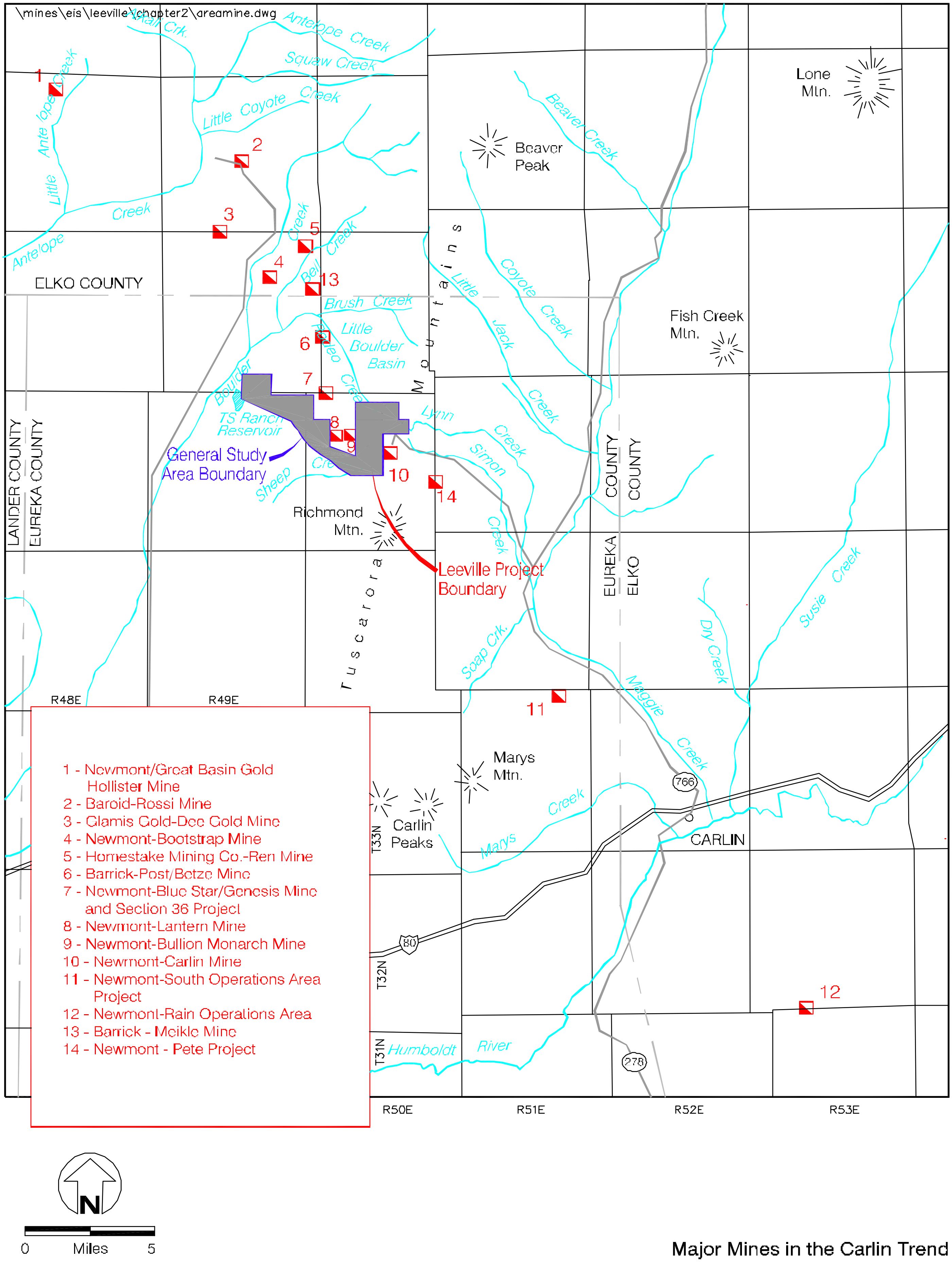
From 1979 to 1982, the Bullion Monarch open-pit mine was operated by Universal Gas. Process facilities for this operation consisted of a mill and associated tailing impoundment. The mill facilities at this site were demolished during 1992 and 1993. The Bullion Monarch open-pit and mill facilities were located in the W½, Section 10, T35N, R50E. The proposed Leeville Project will encompass a portion of the area previously disturbed by the Bullion Monarch Mine Project.

Polar Resources began mining operations at the Betze/Post Mine in 1974; after several different owners this mine was acquired by American Barrick Resources in 1986 and subsequently became the Betze/Post open pit mine (McFarlane 1991a). Barrick began development of the Meikle underground mine in 1995, with processing occurring at the Betze/Post operations.

In 1992, Newmont began exploration on the High Desert (also known as HD Venture) Exploration Project, located in Sections 2, 10, 11, and 12, T35N, R50E and Section 18, T35N, R51E. In 1993, Newmont began exploration on the Chevas Exploration Project, located in sections 1, 2, and 3, T35N, R50E and Section 7, T35N, R51E. Exploration activities within these two projects consisted of mapping, drilling, and trenching.

ORE PROCESSING IN THE CARLIN TREND

Newmont and Barrick operate open-pit and underground mines and process ore using both milling and heap leach facilities in Eureka and Elko counties in the Carlin Trend. Newmont mines and facilities are at the following locations: Rain Operations Area approximately 10 miles southeast of Carlin; South Operations Area 6 miles northwest of Carlin; and North Operations Area approximately 20 miles northwest of Carlin. Barrick's operations include the Betze/Post Mine located adjacent to Newmont's North Operations Area, and the Meikle Mine located immediately north of Betze/Post Mine.



Major Mines in the Carlin Trend
Leeville Project
FIGURE 2-1

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Early ore processing in the Carlin Trend relied on milling and vat leaching to recover gold from high-grade ore. Vat leaching involves grinding rock to a fine sandy texture (milling) and mixing the ground rock with cyanide solution in tanks for removal of gold (vat leaching). Oxidized ore low in carbon could be directly leached, while unoxidized carbonaceous ore was treated with chlorine prior to extraction. Milling methods continue to be economically viable for richer ores, but are generally not cost-effective for low-grade deposits.

Development of heap leaching for gold recovery from low-grade oxide ore began in the 1970s, allowing further expansion of the regional mining industry. Heap leaching involves placing low-grade oxide ore in large heaps and sprinkling the heaps with a weak cyanide solution. The cyanide solution percolates through the heaps, dissolving gold from the ore. The heaps are lined with impervious materials and are designed to channel gold-bearing solution to holding ponds. Gold is removed from the cyanide solution by adsorption to carbon. The carbon is processed to remove the gold and then the gold is shipped to specialty refiners for further refinement.

The effectiveness of cyanide leaching is decreased by presence of carbonaceous material or sulfide in the ore. Sulfide selectively absorbs the cyanide and can encapsulate gold particles. Natural carbon in the ore adsorbs the gold from the cyanide solution. For this reason, mining in the Carlin Trend during the early 1980s focused on near-surface oxidized rock that is amenable to heap leaching. Deeper ores containing sulfide or carbonaceous material require milling and refractory ore processing, which is more expensive than heap leaching. In early 1971, Newmont installed a 500-ton per day chlorine circuit in the mill for oxidizing high-grade carbonaceous ore. Limited mining and stockpiling of deeper sulfidic occurred in the mid- to late 1980s.

In the late 1980s, as new processes were being developed to treat refractory ores in the Carlin Trend, geologists discovered relatively rich gold deposits at greater depth where oxidation of sulfide minerals had not taken place. Geologically, these deep-sulfide refractory ores typically occur in feeder zones through which original mineralizing fluids migrated to permeate upper host rocks. These deep feeder zones typically have a richer gold content than the near-surface ore, but lie below the depth of natural oxidation. Extraction of this ore often requires mining below the water table.

In recent years, techniques have been developed to economically recover gold from both sulfide and sulfidic-carbonaceous refractory ores. Refractory processing methods involve artificially oxidizing the sulfide and carbonaceous material in the ore prior to conventional cyanide extraction. Artificial oxidation is accomplished by heating ore in an oxygen-rich environment (roasting) or adding high pressure to the roasting process (autoclave). Because both of these methods require large amounts of electrical or gas energy, efforts are underway to develop biological or less expensive chemical processes to oxidize the ore. Newmont's bioleach processing facilities are located at the South Operations Area. Presently, however, thermal methods are the only ones used for processing refractory ores in the Carlin Trend. Once the ore has been oxidized, gold is recovered through cyanide extraction.

PREVIOUS AND CURRENT OPERATIONS

LOCATION AND LAND OWNERSHIP

The Leeville Project area lies on the western flank of the Tuscarora Mountains within the Little Boulder Basin in Sections 2, 10, and 11, T35N, R50E. As part of the Proposed Action for the Leeville Project, a water pipeline would be located in Sections 8, 10, 15, 16, and 17, T35N, R50E; Sections 1, 2, 3, and 12, T35N, R49E. Mining claims affected by this project are contained in the Plan of Operations on file at the BLM Field Office in Elko, Nevada.

Previous exploration activities in the Leeville Project area include construction of access roads, drill sites; excavation of trenches and test pits; and installation of test wells and piezometers. Geologic evaluations (exploration activities) are authorized under two exploration plans within the Leeville Project area boundary: the High Desert Exploration Plan of Operations (N16-92-003P) and the Chevas Exploration Plan of Operations (N16-93-002P). Newmont is authorized to disturb 164 acres within the High Desert Exploration Project area boundary and 168 acres within the Chevas Exploration Project area boundary.

Figure 2-2 depicts surface and mineral ownership of land within the Leeville Project area. Existing right-of-way (ROW) easements, also shown on the figure, are discussed in Chapter 3, *Access and Land Use*. **Figure 2-3** shows disturbance in the Leeville Project area associated with exploration operations.

PROPOSED ACTION

In April 1997, Newmont submitted a proposed Plan of Operations (POO) for the Leeville Project to the BLM. The POO includes description of the following proposed activities:

- Developing and operating the Leeville underground mine;
- Constructing a waste rock disposal facility;
- Developing refractory ore stockpiles;
- Shipping ore to Newmont's Mill 6 in the South Operations Area;
- Rerouting and upgrading existing access road to a haul road;
- Constructing a water treatment facility to treat mine discharge water;
- Constructing a pipeline and canal system to deliver water from the Leeville Project dewatering well network to the Boulder Valley infiltration/irrigation system;
- Constructing ancillary facilities;
- Continuing geologic evaluations and exploration activities;
- Rerouting the existing Sierra-Pacific power line; and
- Reclaiming of areas disturbed by activities described above.

The location of the Project in relation to adjacent mining operations is shown on **Figure 2-1**. Total area of proposed disturbance for the Leeville Project would be approximately 486 acres, including 453 acres of public land and 33 acres of private land. The proposed disturbance area encompasses 80 acres of existing disturbance associated with exploration activity at Leeville.

Proposed disturbance areas and acres of disturbance are shown on **Figure 2-4** and in **Table 2-1**. Under current operating plans and projections, Newmont anticipates the Leeville Project to have a mine life of 18 years. A schematic drawing which delineates primary components of the proposed mining and processing systems is shown on **Figure 2-5**.

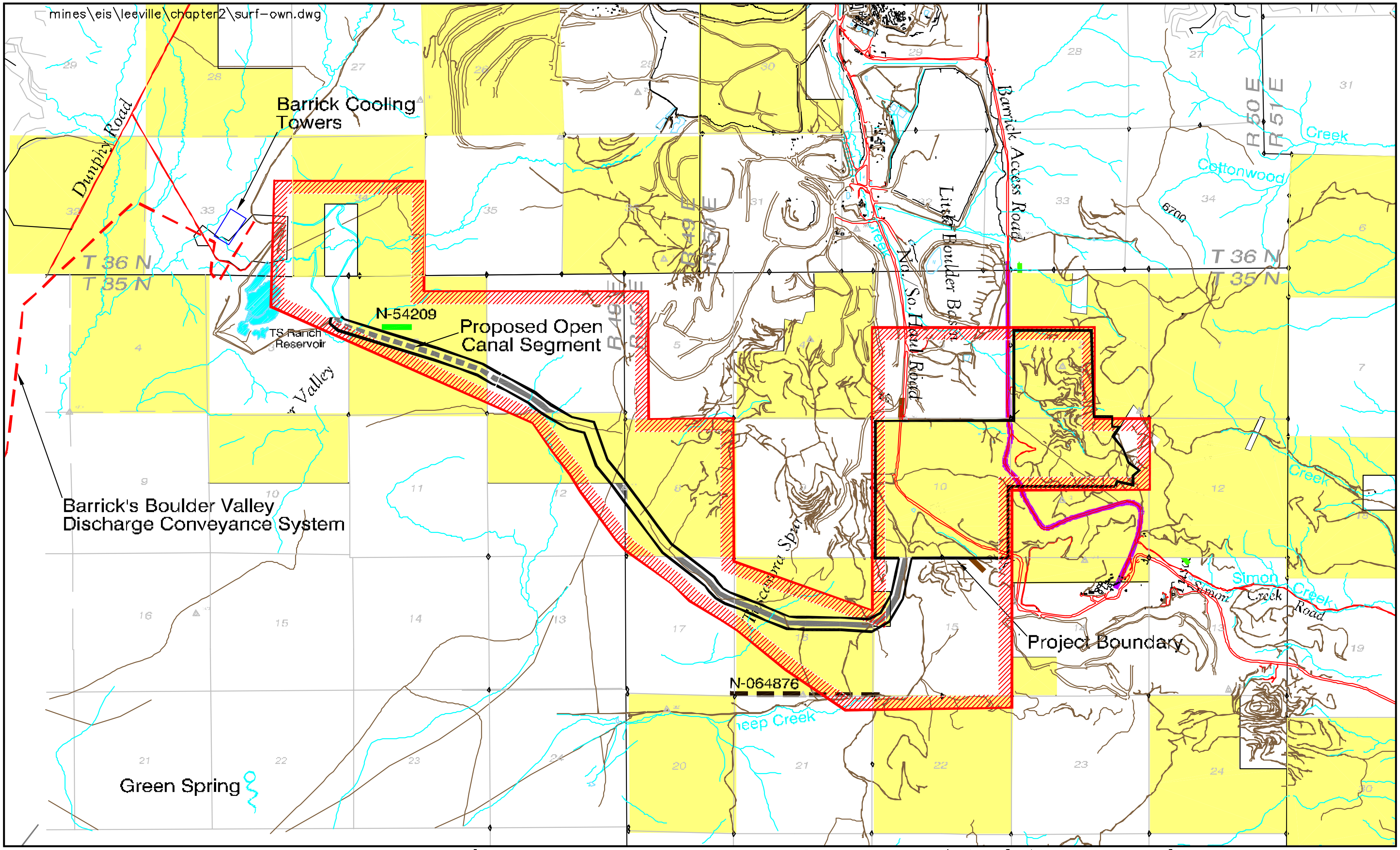
These components of Newmont's Plan of Operations for the Leeville Project constitute the Proposed Action analyzed in this EIS. Reference to the Proposed Action throughout the EIS will mean Newmont's Plan of Operations.

MINING OPERATIONS

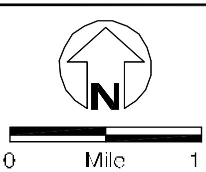
Newmont proposes to remove ore and waste rock from multiple underground ore deposits identified as West Leeville, Four Corners, and Turf. Five shafts (four ventilation and one production) would be constructed to support underground mining for production, underground access, and ventilation. Ore and waste rock totaling 18 million tons would be excavated using conventional underground mining methods. Thick, competent ore zones would be mined by longhole stoping with delayed backfill; thinner and/or less competent ore zones would be mined using underhand drift and fill stoping techniques.

Ore and waste rock would be drilled and blasted in stopes and transported via a series of horizontal haulage ways interconnected by ramps. Horizontal haulage ways would connect to the central production shaft where ore and waste rock would be hoisted to the surface. Loading and haulage of ore and waste rock in the underground operation would be by diesel-powered, rubber-tired mining equipment.

Most mined-out stopes would be backfilled with cemented rock fill consisting of aggregate and cement mixtures. When necessary, suitable aggregate material from other mine areas or quarries on private land would be obtained to provide high-strength cemented backfill for stopes. These materials would be transferred from a surface stockpile (**Figure 2-4**) to a mixing plant located underground. Potential sources of aggregate material to be used for backfill include Barrick's Betze/Post pit and Newmont's Genesis, Blue Star, Lantern, and Bootstrap pits and other as yet to be identified sources located on private land. After mixing



Note: Pipeline Route Source - Power Engineers, Integrated Report for Phases 1 & 2. 6/10/98. Surface Management Status by BLM - 1990.



- Private Surface Land/ Private Mineral Land
- Public Surface Land/ Public Mineral Land
- General Study Area Boundary
- Project Area Boundary
- Main Access Roads
- Pipeline Route
- N-47775 - Sierra Pacific Power Company ROW
- N-54682 - Barrick Access Road ROW
- N-48045 - Barrick Access Road ROW
- N-46957 - Sierra Pacific Power Company ROW
- N 061876 - Newmont Pipeline ROW
- N 54209 - Elko Land and Livestock Co. ROW

Surface and Mineral Ownership/ROW
Leeville Project
FIGURE 2-2

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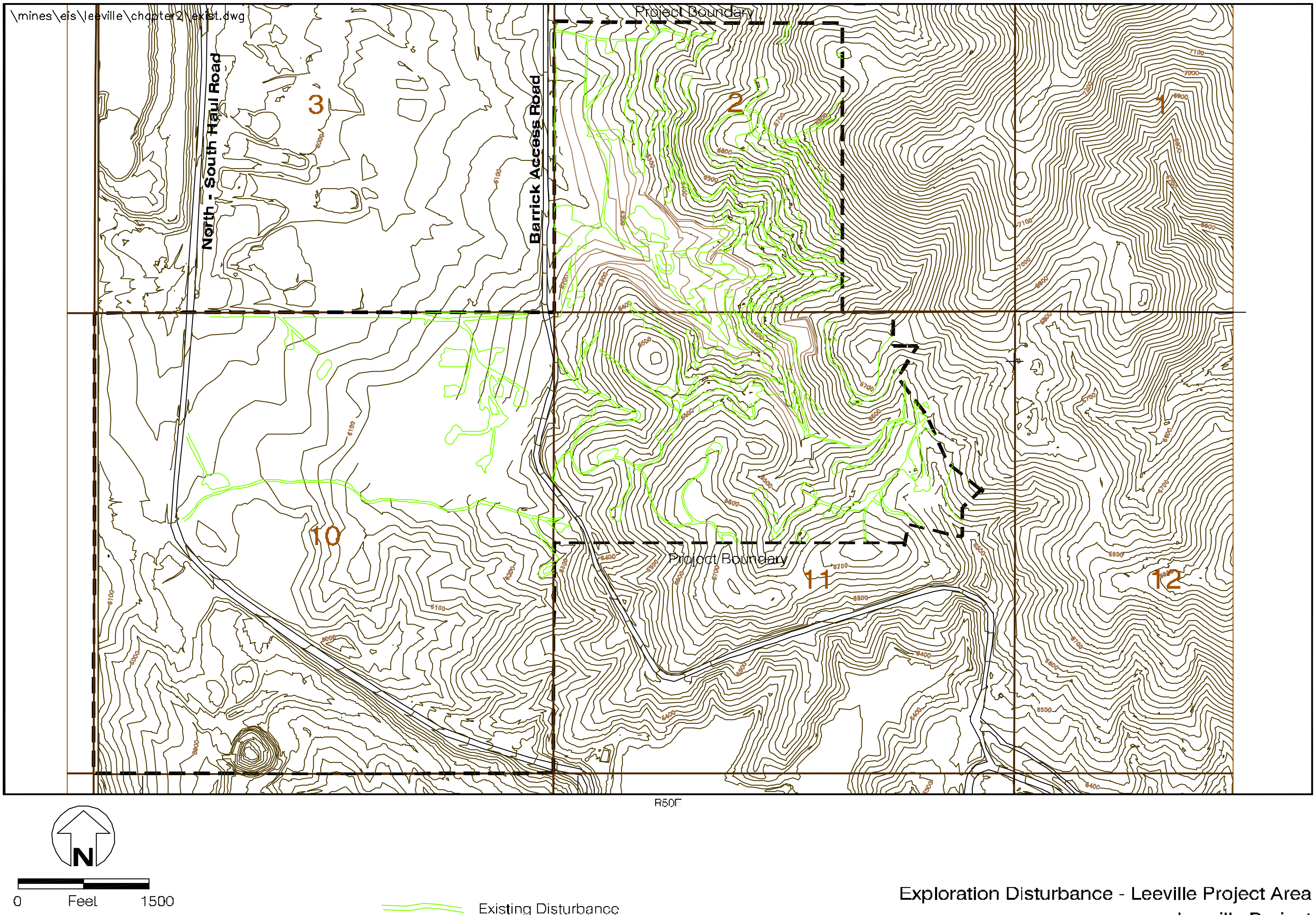

Exploration Disturbance - Leeville Project Area

Leeville Project

FIGURE 2-3

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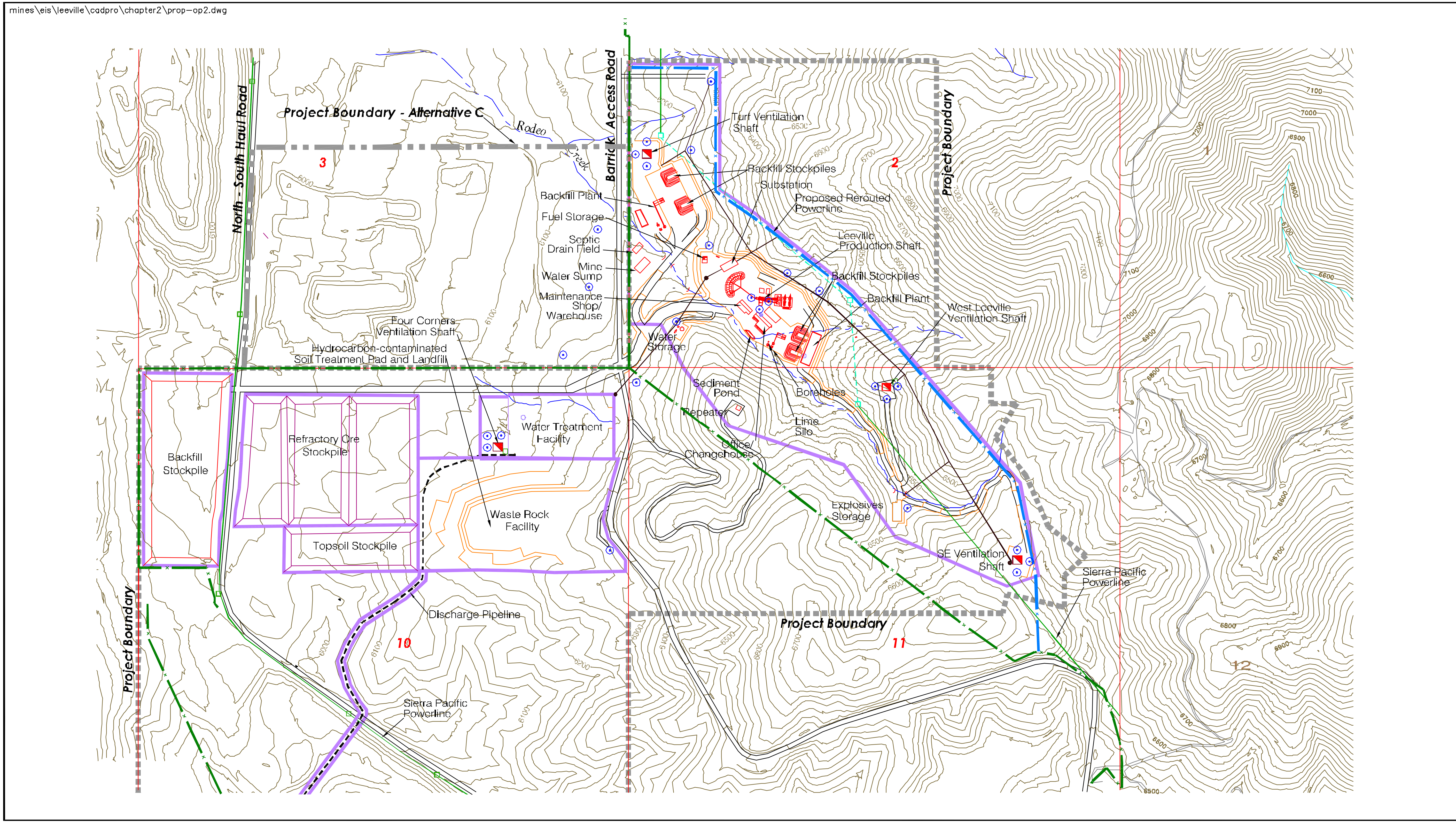

Contour Interval = 25'

0 Feet 1000

- Proposed Power Distribution Lines
- Existing Sierra Pacific Powerline
- Rerouted Powerline
- Project Boundary
- Proposed Dewatering Well
- Ditch/Creek and Culvert
- Shaft
- Proposed Facility Boundary
- Proposed Fence
- Existing Fence

Proposed Operations
Road Network Modification
Leeville Project
FIGURE 2-4

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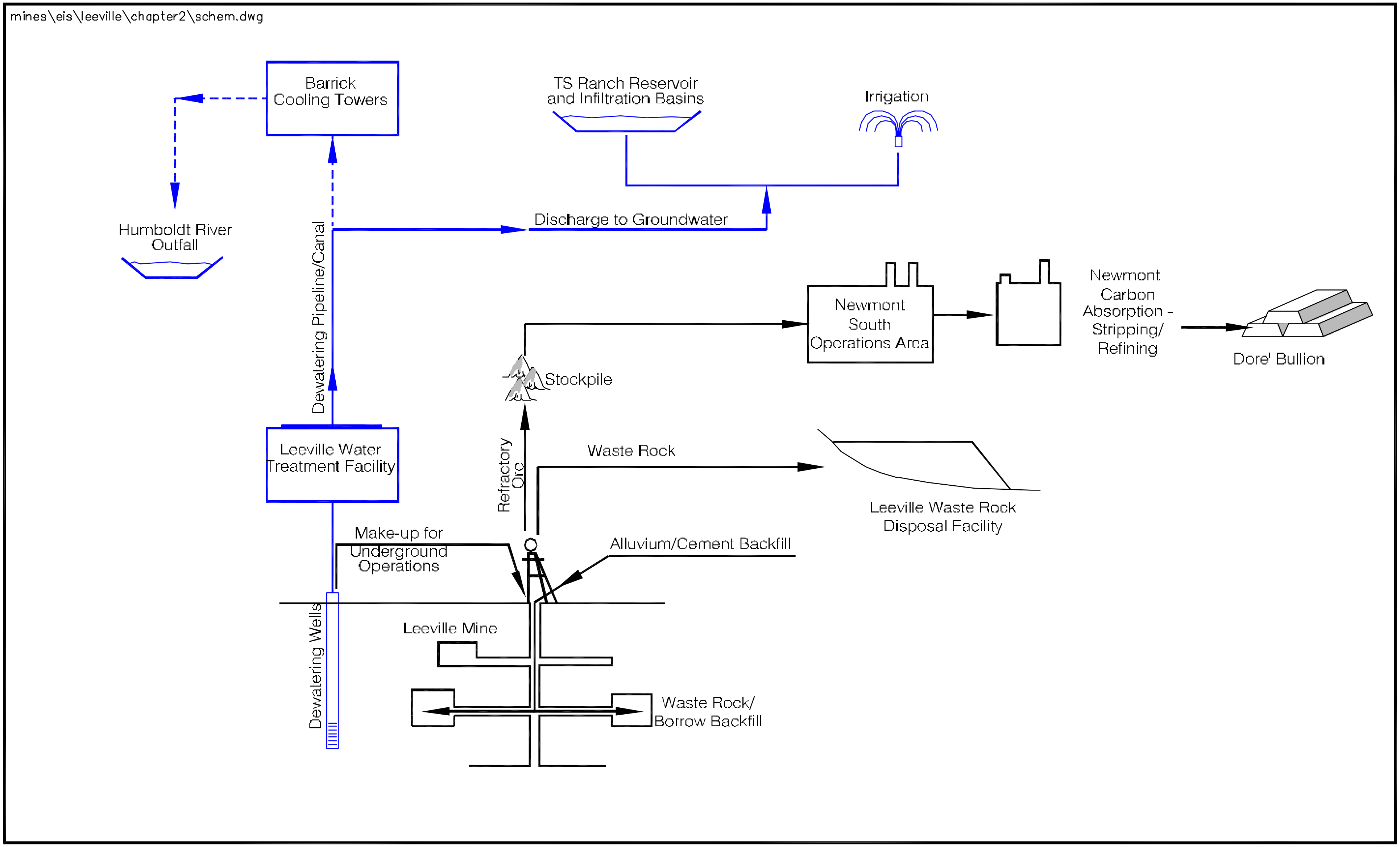

Groundwater Discharge
Requires Authorization of State Engineer

Schematic of Proposed
Mining and Water Handling Operations
Leeville Project
FIGURE 2-5

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TABLE 2-1
Proposed Disturbance in the Leeville Project Area

Proposed Action	Public Land (acres)	Private Land (acres)	Total Land (acres)
Surface Support Facilities	208	0	208
Waste Rock Disposal Facility	57	0	57
Haul Roads	38	0	38
Geologic Evaluations	40	10	50
Refractory Ore Stockpile	61	0	61
Backfill Stockpile	42	0	42
Topsoil	17	0	17
Mine Dewatering System Pipeline/Canal	23	23	46
Mine Dewatering System Ancillary Facilities	47	0	47
Existing Geologic Evaluations[1]	(80)	(0)	(80)
Total Proposed Disturbance	**453**	**33**	**486**

[1]The 80 acres of disturbance associated with the existing geological evaluations are included within the proposed disturbance for surface support facilities, waste rock disposal facilities, and roads.
Source: Newmont 1997a.

aggregate and cement, the mixture would be transported to mined-out stopes. Development waste rock would also be used for stope backfill whenever possible. Waste rock transported to the surface disposal facility would not be returned underground for use as backfill. The engineering properties of this material are not suitable for use in preparing a high-strength cemented backfill.

The Leeville Project ore deposits consist of refractory material that would be hauled directly to processing facilities located at the Refractory Ore Treatment Plant at Newmont's South Operations Area **(Figure 2-6)** or would be temporarily placed in a refractory ore stockpile located in Section 10, T35N, R50E (**Figure 2-4).** Approximately 18 million tons of ore and waste rock would be removed over an 18-year mine life. Projected production rates for the Leeville Project are shown in **Table 2-2.**

Construction of five mine shafts (one production shaft and four ventilation shafts) and surface support facilities at the Leeville Project would disturb 208 acres of public land in Sections 2, 10 and 11, T35N, R50E (**Figure 2-4**). Precise dimensions of mine shafts have not been finalized; however, in general, the production shaft may range from 20 to 26 feet in diameter and the West Leeville ventilation shaft may be 14 to 20 feet in diameter. Other ventilation shafts may be 13 feet in diameter. Shafts would extend 2,500 feet below existing ground surface.

Shaft construction would be initiated with construction of a shaft collar. The first 85 to 100-feet below ground surface would be excavated using standard construction equipment. Concrete forms set inside the excavation temporarily support shaft collar excavation. Concrete is then poured to form the shaft collar and lining. After the concrete has cured, work decks for shaft sinking are lowered into the collar structure and a temporary bulkhead placed over the collar. Head frames and hoisting plants are constructed over the shafts and shaft-sinking equipment installed.

Shaft sinking at the Leeville Project would be performed using conventional drill and blast methods. This type of shaft sinking is a cyclical process where the shaft is constructed incrementally. Elements of the cycle include drilling, blasting, mucking, and installation of temporary ground support and shaft lining (concrete liner) to control ground movement. The concrete shaft liner installed in each shaft would be designed to prevent seepage into the shafts. Steel sets would be installed to provide a structural framework for the hoisting system. Blast holes are drilled vertically into the shaft bottom to depths ranging 8 to 10 feet. Blast holes are loaded with explosives and detonated. Broken rock resulting from the blast is loaded into large buckets and hoisted to the surface. Rock bolts and wire mesh are installed on shaft walls to provide temporary ground support. Circular concrete forms are lowered to within a few feet of the shaft bottom and temporarily set. Concrete is poured behind the forms to form the shaft liner. If ground conditions are relatively stable, two or more cycles of drilling, blasting,

TABLE 2-2
Projected Leeville Mine Production

Year	Waste Rock (tons)	Ore (tons)	Total (tons)
1	33,000	0	33,000
2	134,000	0	134,000
3	300,000	0	300,000
4	221,000	0	221,000
5	202,000	0	202,000
6	492,000	374,000	866,000
7	533,000	785,000	1,318,000
8	252,000	1,344,000	1,596,000
9	266,000	1,513,000	1,779,000
10	227,000	1,573,000	1,800,000
11	231,000	1,568,000	1,799,000
12	296,000	1,466,000	1,762,000
13	221,000	1,408,000	1,629,000
14	262,000	1,408,000	1,670,000
15	132,000	1,180,000	1,312,000
16	135,000	881,000	1,016,000
17	30,000	372,000	402,000
18	17,000	209,000	226,000
Total	**3,984,000**	**14,081,000**	**18,065,000**

Source: Newmont 1997a.

and mucking may be completed before advancing the concrete lining. After the concrete shaft liner has cured sufficiently, utility lines and structural steel required for hoisting would be installed. After installation of utility lines, another cycle of shaft sinking can be undertaken.

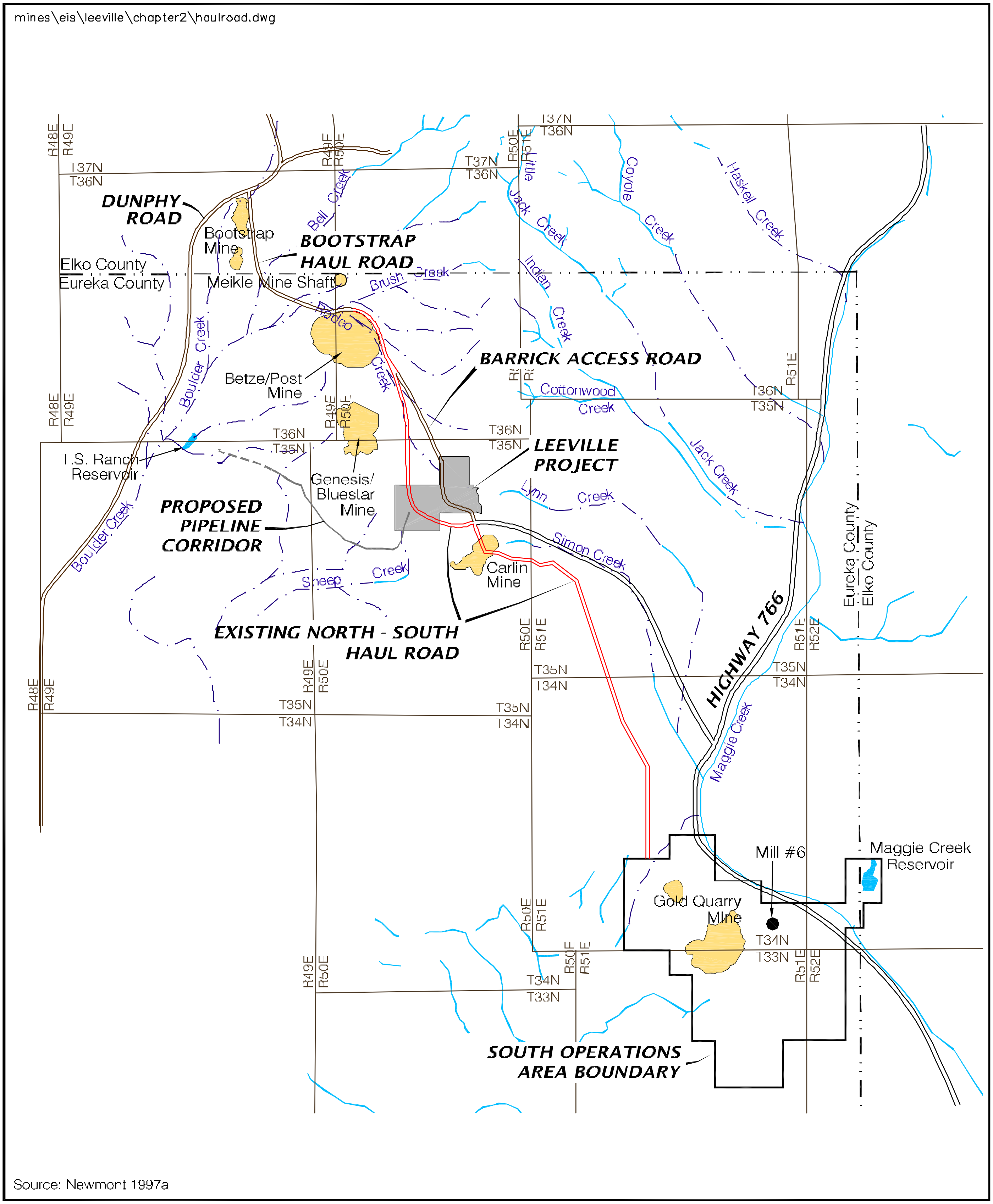
If large volumes of water are encountered during shaft sinking pressure grouting would be used to seal rock fractures. Once groundwater inflow is controlled shaft sinking would resume as described above.

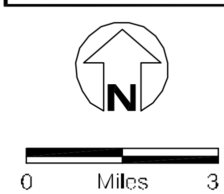
Construction of the collar, headframe, and hoisting plant and installation of shaft-sinking equipment is expected to require 7 months for the production shaft and 5 months for ventilation shafts. Average shaft-sinking rate for production and ventilation shafts is expected to be 5 to 6 feet per day. The production shaft is expected to require 11 months to complete; ventilation shafts would require about 8 to 9 months for completion. After shaft sinking has been completed, excavation and construction of shaft stations and facilities for storage and loading of ore and waste rock, electrical power distribution, and pumping would occur. Shaft station construction and installation of equipment is expected to require 2 to 3 months for ventilation shafts and 8 months for the production shaft.

MINE DEWATERING

Ore deposits at the Leeville Project lie below the water table which is at a current elevation of approximately 5,700 feet above mean sea level (AMSL) in the upper plate (siltstone) and about 4,900 feet AMSL in the lower plate (carbonate) (Newmont 2000; 2001). Dewatering activities presently underway at the Goldstrike Property (includes Barrick's Betze/Post open pit mine and Meikle underground mine) and Gold Quarry mines are lowering the regional water table in the Project area. Additional dewatering wells would be needed to lower groundwater levels sufficiently for the Leeville Project to proceed. Initially, Newmont proposes to install eight dewatering wells in the upper plate and seven wells in the lower plate. Drill pads constructed for wells would be 50 feet by 85 feet. Up to 35 dewatering wells could be necessary to lower groundwater to an approximate elevation of 3,800 feet AMSL in the lower plate. Localized water that is not intercepted by the network of dewatering wells and enters the mine workings would be routed to one or more central sumps for removal from the mine.

Newmont's current dewatering plan requires pumping wells completed in groundwater in the upper plate during sinking of all five shafts. Pumping from these wells would be suspended once shaft construction has sufficiently





North - South Haul Road
Barrick Haul and Access Road
Paved Road
Project Area
Perennial Stream Segment
Intermittent Steam Segment

Haul Road Locations
to South Operations Area
Leeville Project
FIGURE 2-6

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advanced. The groundwater system in the upper plate (siltstone) would then be allowed to recover while pumping continues from lower plate wells (carbonate). Lower plate wells would dewater the lower bedrock unit, including the ore zone.

Should groundwater inflow to shafts occur during construction in volumes that impede shaft sinking activity, pressure grouting techniques would be used in the upper plate rocks to seal fractures and reduce inflow. This technique may be used if excessive groundwater inflows are encountered during underground development and mining.

Estimated average groundwater pumping rates for the Leeville Project are presented in **Table 2-3,** and are based on predictions developed using a geologically-based, three-dimensional finite element hydrologic computer model of the Leeville Project and other mines in the Carlin Trend. The model was developed in the context of other area mines and was used to determine groundwater dewatering rates required in the Leeville Project area.

As shown in **Table 2-3**, the maximum pumping rate of 25,000 gallons per minute (gpm) is expected to occur in years 1-2. Once ground-water levels are depressed, pumping rates can be reduced to 6,000 to 9,000 gpm to maintain the desired groundwater level (years 5-18).

A mine water sump would be constructed on the surface consisting of two reinforced concrete silting basins equipped with weirs, oily water collection basins, oil skimmers, and waste oil collection tanks. Mine water would come into contact with mine machinery where oil and grease could be released into the water. Each basin would be approximately 125 feet long, 120 feet wide, 5 feet deep, and have a capacity of 350,000 gallons. A dam permit would not be required for the mine water sump. The water would be treated for hydrocarbon removal and used for dust control at the mine.

Mine water may also be used for production and dust control at the Project area. Production requirements for the Leeville Project would vary throughout the year, but would not consume enough water to eliminate the need for discharge. Excess groundwater remaining after production and dust control requirements have been met would be used for 1) irrigation in the Boulder Valley during the appropriate season and, 2) discharged to infiltration basins (including the TS Ranch Reservoir) during non-irrigation periods. Should conditions arise where Newmont could not effectively discharge water using these systems or find other locations where infiltration would accommodate the volume of water, Newmont would seek to directly discharge to the Humboldt River via the Boulder Valley conveyance system under discharge permit NEV0022675. This permit was issued to Barrick by Nevada Division of Environmental Protection (NDEP) with a provision that other mines in the area be allowed to use this permitted outfall. Discharge would not be allowed to the Humboldt River unless authorized by the State Engineer and only if the excess water cannot be removed via infiltration, injection, and/or irrigation.

Used potable water (e.g., shower water and sewage) would flow to a septic system. The septic system would be located a minimum 150-feet from a stream channel and outside the 50-year floodplain. The location of the septic system is shown on **Figure 2-4**.

Water Treatment

Newmont would construct a water treatment facility to treat groundwater pumped from the mine dewatering well system. The water treatment plant would use chemical precipitation to reduce arsenic concentrations and any other parameters to meet state standards prior to conveyance in the discharge pipeline system. Sludge generated from the water treatment facility would be transported by truck to Mill 4 Tailing Disposal Facility located in the North Operations Area for disposal.

Should groundwater be discharged to the Humboldt River under Barrick's discharge permit, the water would require cooling to meet discharge temperature requirements. Newmont would use Barrick's cooling towers to reduce the temperature of discharge water to meet State of Nevada water quality standards (**Figure 2-7**).

Water Discharge Pipeline/Canal System

Groundwater would be transported from dewatering wells located at Leeville to Barrick's cooling canal, located about 5.5 miles west of Leeville, through a gravity-fed, 42-inch diameter pipeline and canal. **Figure 2-7** shows the proposed route of the pipeline and canal for the Leeville Project dewatering system. The pipeline would be buried, except in rocky areas where it would be located on the surface.

TABLE 2-3
Dewatering Rates – Leeville Project

Years After Start of Dewatering	Gallons Per Minute (gpm)
1 – 2	25,000
3 – 5	8,000 – 10,000
5 – 18	6,000 – 9,000

Source: Hydrologic Consultants, Inc. (HCI) 1999a.

The last segment of the proposed pipeline system would be an open canal system. The canal would begin near the western edge of Section 1, T35N, R49E, and continue approximately 5,700 feet to its terminus at Barrick's existing cooling canal located near the TS Ranch Reservoir (**Figure 2-7**). The canal would be constructed with 3.0 horizontal to 1.0 vertical (3.0H:1.0V) side slopes, a synthetic liner, a nominal 15-foot bottom width, and average 3.5 feet in depth (Power Engineers 1998). Approximately 23 acres of public land and 23 acres of private land controlled by Newmont (46 acres total) would be disturbed during construction of the pipeline and canal system.

Water would pocket in eight locations along the pipeline in low spots during dewatering shutdown periods. Occasionally, these pockets or low spots would be drained through valves to facilitate maintenance and repair of the pipeline. The volume of water to be drained ranges from 15,000 gallons to 500,000 gallons (210 feet to 6,900 feet of pipeline), depending on location. Water drained from the pipeline at each low spot would report to riprap areas located adjacent to the valve and infiltrated.

WASTE ROCK DISPOSAL FACILITY

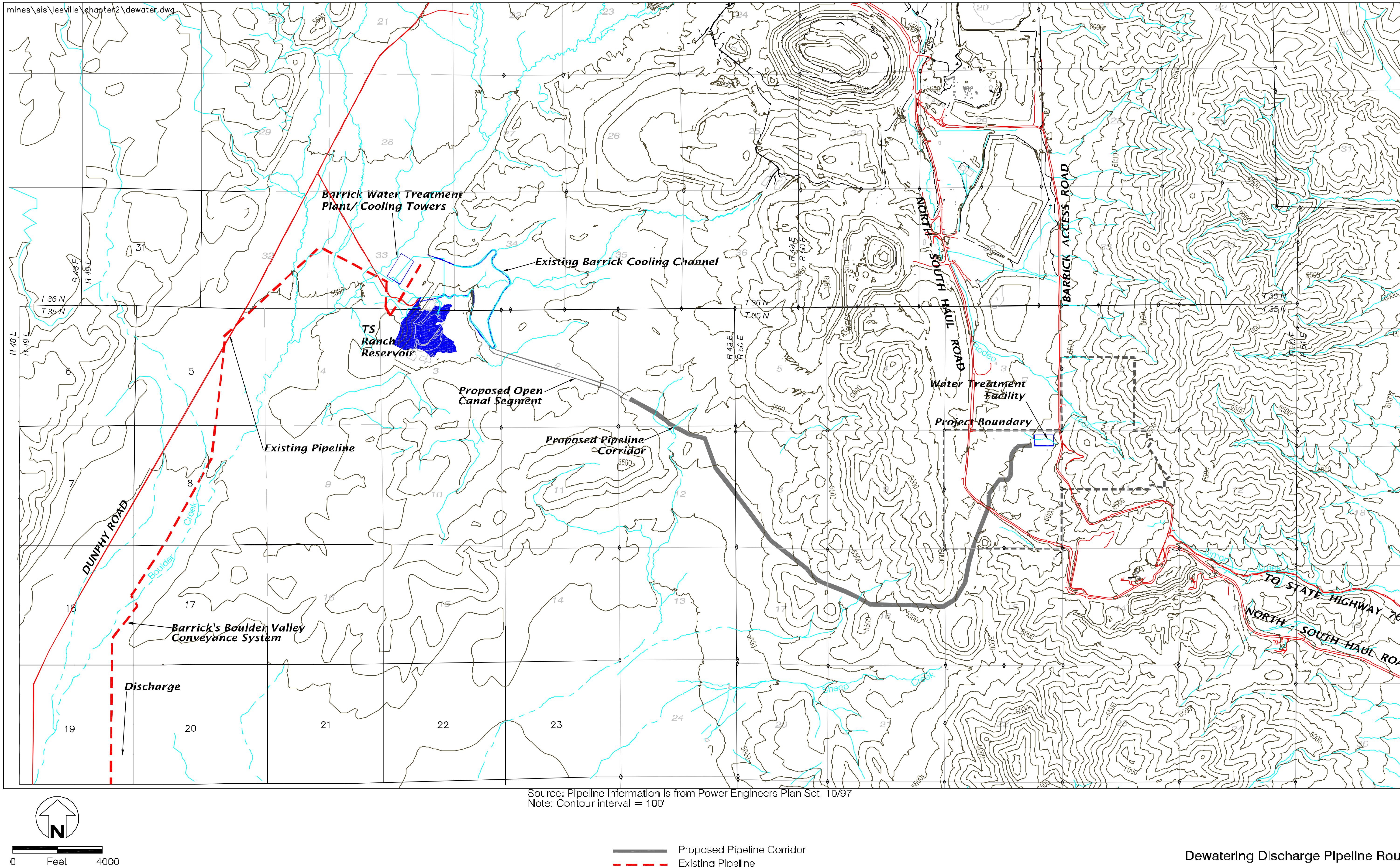
Development of the Leeville Project would require construction of a new waste rock disposal facility to be located in Section 10, T35N, R50E (**Figure 2-4**). The waste rock disposal facility would be engineered for stability and designed, where practicable, with boundaries to blend with surrounding topography. The proposed waste rock disposal facility would disturb approximately 57 acres of public land with a capacity up to 4 million tons.

For the design of the waste rock disposal facility, a magnitude 7.0 earthquake was used for the maximum credible earthquake, based upon past regional seismicity and the apparent lack of continuous Holocene-age fault scarps within the site area (Newmont 1997a). However, since epicenters are not closely associated with identified faults in this region, the epicenter of an maximum credible earthquake could occur anywhere within the area (Ryall 1977).

Consistent with standard and accepted design practices, the value of 0.13 gravity (g) is taken as two-thirds of the maximum horizontal ground acceleration of 0.2g expected to occur as a result of the design seismic event of 7.0 on the Richter scale. Newmont has designed the waste rock storage facility with a horizontal coefficient of acceleration of 0.13g used to simulate earthquake loading for a pseudostatic case.

Waste rock would be placed by end-dumping down an advancing face in successive horizontal lifts of 20 to 120 feet, depending on topography. The waste rock disposal facility would be con-structed to an overall height of 120 feet above ground surface. Waste rock would be reclaimed at an overall average slope of 2.5H:1.0V.

A portion of waste rock resulting from development and operation of the Leeville Project underground mine would have Potentially Acid-Generating (PAG) waste rock. Due to the nature of underground mining, segregation of PAG waste rock is not usually possible. In cases where acid-base accounting (ABA) indicates the total mixture of waste rock is acid generating, Newmont would encapsulate PAG material within the waste rock disposal facility. Encapsulation is achieved by placing waste rock on a base constructed of compacted, low permeability materials, designed to prevent vertical migration of fluids. Base material would consist of mine waste rock and subsoil excavated from shaft sites that is random wheel compacted and sloped to allow drainage to a collection point. Majority of water draining to the collection point is lost to evaporation. Collection areas would be periodically inspected by Newmont personnel to determine conditions requiring removal and transport of excess water. Excess water would be trucked to Newmont's Mill 4 tailing facility located north of the Project site.



Source: Pipeline Information is from Power Engineers Plan Set, 10/97
Note: Contour interval = 100'

Proposed Pipeline Corridor
Existing Pipeline
Primary Access and Haul Roads
100' Contour

Dewatering Discharge Pipeline Route
Leeville Project
FIGURE 2-7

blank

The toe of sulfide (PAG) material is placed back from the perimeter limits of the ultimate footprint of the waste rock disposal site to allow placement of an outer cover of acid-neutralizing waste rock. Due to size sorting which occurs during end-dump construction, low permeability base would be overlain by the coarsest material within the next lift. This layer provides a preferred flow path for water migrating downward through the disposal facility, and promotes lateral flows along the low permeability base. This inhibits water from contacting the PAG waste rock for extended periods of time.

Surface drainage upslope of the base perimeter of the waste rock disposal facility would be diverted with ditches to prevent run-on to the disposal facility. During construction, a minimum 1 percent gradient would be maintained on lift surfaces to reduce infiltration. Surface compaction from haul trucks and dozer traffic would help minimize infiltration of water into the disposal facility.

A low permeability cap would be constructed on the final lift of PAG material. The cap would be constructed of random wheel compacted clay or alluvium to provide a barrier to limit infiltration fluid migration and thereby reduces the volume of acid rock drainage. The low permeability cap would be 24-inches thick and sloped to promote runoff, further reducing potential for water to contact PAG waste rock. The cap would be covered with 24-inches of growth medium and designed so regrading during final reclamation would not breach the cap.

Inspection of the waste rock disposal facility would be performed quarterly, and following heavy spring snow melt or precipitation, to detect abnormal conditions, anticipate remedial actions, and ensure integrity of ditches, berms, and collection ponds. Evaluation of waste rock analyses are included in permit-mandated Water Pollution Control Reports for the facility.

ORE STOCKPILES AND ORE PROCESSING

Approximately 14 million tons of refractory ore would be excavated through development of the Project. Ore would be directly hauled to Newmont's South Operations Area, or temporarily stockpiled in a refractory ore stockpile at the Project area (**Figure 2-4**) pending shipment to the South Operations Area. The ore would be shipped using 120 to 190-ton trucks. Haulage of refractory ore to the South Operations Area would be via the existing North-South Haul Road (**Figure 2-6**). Haul truck traffic associated with Leeville production on the North-South Haul Road would remain at existing levels of 25 to 40 trucks per day. Newmont anticipates haulage of refractory ore from existing sources in the North Operations Area would be decreasing at about the rate and time that the Leeville Project would be reaching production levels.

Construction of refractory ore stockpiles would be in accordance with Newmont's Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1997a). Ditches would be constructed around the base of each stockpile to divert surface runoff away from the area. Refractory ore stockpiles would be built on low permeability bases compacted and sloped to allow drainage to a collection point. **Table 2-4** shows the facility capacities and dimensions of the stockpile.

The majority of water draining to the collection area is lost to evaporation. Collection areas would be periodically inspected by Newmont personnel to determine conditions requiring removal and transport of excess water. Excess water would be trucked to Newmont's Mill #4 tailing facility located north of the Project site. Any refractory ore material remaining at the end of the Project would be removed to ore processing facilities at Mill #6. Refractory ore stockpiles are described in more detail in Newmont's Plan of Operations (Newmont 1997a).

Tailing from processing Leeville ore at South Operations Area would be deposited in existing tailing disposal facilities. Modification or expansion of the tailing disposal facility beyond the current authorized capacity would not be required to process ore from the Leeville Project.

TABLE 2-4
Projected Facility Capacities and Dimensions

Facility	Capacity	Dimensions (Approximate)
Waste Rock Disposal	4,000,000 tons	1,700 ft L x 1,100 ft. W x 120 ft. H
Backfill Stockpile	1,000,000 tons	2,000 ft. L x 900 ft. W x 15 ft. H
Refractory Ore Stockpile	1,000,000 tons	2,000 ft. L x 1,400 ft. W x 10 ft. H
Topsoil Stockpile	500,000 cubic yards	1,400 ft L x 500 ft. W x 20 ft. H

Source: Newmont 1997a

ROADS

Haul Roads

Approximately 38 acres would be disturbed to construct haul roads (120-foot wide running width) to provide haul truck access to the Leeville Project production shaft, waste rock disposal facility, refractory ore stockpile, North-South Haul Road, backfill stockpile, and backfill plants. Construction of a road crossing would be completed at the intersection of the Leeville Project haul road and the Barrick Access Road. Signs would be installed to ensure traffic safety at this intersection.

Access Roads

Access roads would be constructed to provide service access to outlying ventilation shafts, water wells, pipelines, water treatment facility, and radio communication site. Existing exploration roads that currently provide access to these areas would be upgraded to an approximate running width of 25 feet and a maximum grade of 10 percent. Access roads would be graveled using acid-neutral to acid-neutralizing material from existing pits or gravel may be purchased from outside commercial sources. Culverts would be installed where access roads cross the Rodeo Creek channel. Preliminary designs indicate that 54-inch diameter culverts would be installed.

ANCILLARY FACILITIES

Ancillary facilities at the Leeville Project would be located above and below ground. Underground facilities would include electrical substations, powerlines, ore and waste rock storage bins, sumps and pump stations, and storage bins for cement and backfill.

Above ground facilities would include: equipment maintenance shop, explosives magazine, radio communication site, utility systems, septic drain field, fuel storage, water treatment facility, hydrocarbon bioremediation facility, landfill, warehouse, office, change house, security office, and surface water control ditch system.

A four-strand barbed wire fence with steel posts spaced every 10 feet would be installed along the east and northeast portions of the proposed facility boundary (**Figure 2-4**). Every seventh post would be a set post. Corners would have standard BLM-approved H-braces. Five-strand barbed wire gates would be used. Approximately 8,600 feet of new fence would be constructed and would tie into existing fences. Roads to the southeast ventilation shaft and radio communication site would likely be gated.

Backfill Plants

Newmont proposes to construct two backfill plants consisting of backfill stockpiles, conveyors, and cement silos. Measured amounts of dry cement and backfill material would be transferred through boreholes to a mixing plant located underground.

Energy

Electrical power would be provided by accessing an existing 120 kilovolt (kV) Sierra Pacific Power Company transmission line. Electrical power would be required at mine ventilation and pro-duction shafts, dewatering wells, and other surface support facilities; 25 kV would be required to service outlying dewatering wells. A new substation would be constructed for the Leeville Project to reduce voltage to 4.16 kV for distribution to underground and surface facilities.

Some of the shafts and facilities associated with the Leeville Project would be located along the current route of the transmission line. Newmont would coordinate with Sierra Pacific Power Com-pany to relocate the existing power line (N-47775 Power Line ROW) around Project facilities. Approximately 0.6 miles of the existing 120 kV power line would be relocated. A diesel-fired electrical generator would be installed for emergency evacuation and ventilation in the event of a power failure.

Water Control Ditches

Surface water control ditches would be con-structed as necessary around surface facilities, backfill stockpile, refractory ore stockpile, and waste rock disposal facility to control stormwater run-on to these sites. Surface water control ditches and sediment retention ponds would be designed and con-structed in accordance with Best Management Practices (BMPs) as outlined in the Handbook of Best Management Practices (Nevada State Conservation Commission 1994). Sediment ponds and diversion ditches would be sized to contain a 2-year, 6-hour precipitation event of 0.8 inches.

Newmont would obtain a stormwater discharge permit for the Leeville Project. Stormwater would be controlled using BMPs as defined by Nevada State Conservation Commission (1994) and include material handling procedures that minimize exposure of materials to stormwater; defines spill prevention and response measures; identifies sediment and erosion control measures; and describes physical stormwater controls. Stormwater run-on would be controlled by interceptor ditches upgradient of surface facilities. Interceptor ditches would be designed and constructed to accommodate a 2-year, 6-hour precipitation event (0.8 inches). Ditches would divert uncontaminated run-on water back into the natural drainage down gradient from disturbed areas.

Landfill

A Class III landfill would be located in the waste rock disposal facility for approved inert solid waste including wood, rock, brick, concrete, and vehicle tires. The specific disposal site on the waste rock disposal facility would change to coincide with area of active waste rock dumping. A hydrocarbon bioremediation facility would also be constructed to treat petroleum hydrocarbon contaminated soil on an inactive portion of the disposal facility. Hydrocarbon contaminated soil would result from petroleum spills or leaks occurring at the Leeville Project site.

GEOLOGIC EVALUATIONS

Newmont proposes to continue geologic evaluations (exploration) within the Leeville Project area during the life of the Project under this plan of operations. Geologic evaluation activities would include exploration and develop-ment drilling, geochemical sampling, excavation of test pits, trenching, and application of various geophysical methods. Surface disturbance created by drilling operations would consist of construction of roads, drill pads, and sumps. These activities would be conducted in accordance with approved exploration plans (N16-92-003P, and N16-93-002P) and applicable BLM and NDEP regulations and result in a maximum disturbance of 50 acres.

RESOURCE MONITORING

Air Quality

Newmont would obtain an air quality permit for the Leeville Project from NDEP. The permit would specify air quality monitoring requirements. Fugitive emissions would be controlled using BMPs as defined by the Nevada State Conservation Commission (1994). Dust emissions would be controlled through use of direct water application, chemical binders or wetting agents, dust collection devices and water sprays, and revegetation of disturbed areas concurrent with operations. Stationary sources of regulated air pollutants would be controlled to meet conditions of the NDEP air quality permit.

Water Resources

Water resources in the Leeville Project area are monitored within Boulder Flat and Maggie Creek hydrographic basins as part of Barrick's and Newmont's approved Plans of Operations. The current monitoring program addresses ground-water, springs/seeps, and streams/rivers. The purpose of hydrologic monitoring is to establish baseline data and report changing conditions as mining operations continue and expand in the area. Water quality, groundwater levels, and surface water flow are measured monthly, quarterly, or biannually at designated monitoring wells, springs/seeps, and surface water stations. Semi-annual monitoring reports prepared by Barrick (Boulder Valley Monitoring Plan) and quarterly reports prepared by Newmont (Maggie Creek Basin Monitoring Plan) summarize water resources monitoring data collected to date.

The U.S. Geological Survey (USGS) also col-lects groundwater and surface water data in the Project area. Additional details on the hydrologic monitoring program in the Project area are inc-luded in Chapter 3, *Water Quantity and Quality*. Newmont would monitor stability and function of the diversions and maintain them as required.

Newmont would monitor waste rock for potential acid generation in accordance with Water Pol-lution Control permits. Waste rock would be handled in accordance with Newmont's Refractory Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1997a).

Cultural Resources

Cultural resource inventories have been completed for the Leeville Project area. New sites that may be discovered during future cultural inventories would be mitigated by Newmont in accordance with Section 106 of the National Historic Preservation Act (Newmont 1997a). For additional discussion of cultural resources, see Chapters 3 and 4, *Cultural Resources*.

Paleontological Resources

In the event vertebrate fossils are discovered within the Leeville Project area during mining operations, Newmont would immediately notify the BLM Authorized Officer. Activities that could occur after notification include cessation of mining activities in the area of discovery, verification and preliminary inspection of discovery, and development/implementation of plans to avoid or recover the fossils.

HAZARDOUS MATERIALS

Quantities Greater Than Reportable Quantities

The term “hazardous materials” is defined in 49 CFR 172.101. Hazardous substances are defined in 40 CFR 302.4 and the Superfund Amendments and Reauthorization Act (SARA) Title III. Hazardous materials and hazardous substances that would be transported, stored, or used at the Leeville Project in quantities greater than the Threshold Planning Quantity (TPQ) designated by SARA Title III for emergency planning are summarized in **Table 2-5**.

The primary route for transporting hazardous materials to the Leeville Project area would be via State Highway 766 north of Carlin, Nevada and then via Barrick Road to the mine site. The alternative transportation route would be via Dunphy Road connecting to Barrick Road from the north. U.S. Department of Transportation (USDOT)-regulated transporters would be used for shipment. USDOT-approved containers would be used for on-site storage (Newmont 1997a), and spill containment structures would be provided. Hazardous materials would be stored in designated areas on private and public land, and in underground mine workings.

Ore mined at the Leeville Project would be processed at Newmont’s Mill #6 in the South Operations Area. Processing of Leeville ore would prolong the shipping and use of various chemicals used at Mill #6 by as much as ten years. Use of these chemicals is described and analyzed in the 1993 SOAP and 2001 SOAPA EISs.

Quantities Less Than Reportable Quantities

Small quantities of hazardous materials less than the TPQ not included in **Table 2-5** would also be managed at the Leeville Project area. These include auto and equipment maintenance products, office products, paint, and batteries.

Spill Prevention and Response Procedures

Newmont’s Spill Prevention, Control, and Countermeasure (SPCC) Plan (Newmont 1995a) states that all maintenance facilities and fueling vehicles would be equipped with spill response materials. Earth moving equipment would be available from the mining operation for constructing dikes. Above ground tanks and associated piping would be visually inspected for leaks on a daily basis. Bulk storage tanks would be constructed with secondary containment to accommodate 110 percent of volume of the largest tank. Mobile or portable storage tanks would be isolated to prevent hazardous materials spills from reaching surface water.

Newmont personnel would be instructed in operation and maintenance of equipment to prevent the discharge of oil. Spill response training would be provided through the Environmental Compliance Awareness Program outlined in Newmont’s Emergency Response Plan (Newmont 1995b). Supervisors would schedule and conduct spill prevention briefings for personnel that would include a review of the Spill Prevention, Control and Countermeasure Plan.

TABLE 2-5 Hazardous Materials Management Leeville Project					
Substance	**Area Used/Stored**	**Rate of Use (per year)**	**Quantity Stored On-site**	**Storage Method**	**Waste Management**
Diesel Fuel	Mine/truck shop	1,500,000 gal	20,000 gal	Bulk tank	No waste
Hydraulic Fluid	Mine/truck shop	80,000 gal	3,000 gal	Bulk tank totes, drums	Recycled
Motor Oil	Mine/truck shop	20,000 gal	1,500 gal	Bulk tank totes, drums	Recycled
Antifreeze	Mine/truck shop	1,500 gal	480 gal	Bulk tank totes, drums	Recycled
Explosives	Mine/(surface & underground)	1,300,000 lbs	25,000 lbs	Magazines (surface & underground)	No waste
Gasoline	Mine/truck shop	15,000 gal	5,000 gal	Bulk tank	No waste
Propane	Mine/surface	1,500,000 gal	45,000 gal	Bulk tank	No waste
Grease	Mine/truck shop	15,000 lbs	2,400 lbs	Totes, drums	Recycled

gal = gallon; lbs. = pounds
Source: Newmont 1997a

Known spills, malfunctioning components, and precautionary measures would be discussed during briefings.

Hazardous Wastes

Hazardous waste generation, treatment, and disposal is regulated by the federal Resource Conservation and Recovery Act (RCRA)(40 CFR §260-270.) Under RCRA, Newmont would be considered a “conditional exempt small quantity generator,” for activities at the Leeville Project because less than 100 kilograms of hazardous waste would be generated each month.

Newmont has a waste minimization program to evaluate hazardous substances used on mine property. Where possible, alternative products that generate no waste or solid waste, rather than RCRA-regulated hazardous waste, would be used. Hazardous wastes generated at the Leeville Project would be transported to permitted waste disposal facilities by licensed waste haulers. When practicable, the wastes would be sent to recycling facilities.

Toxic Release Inventory

Since 1998, the mining industry has been required to comply with Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA, Public 99-499, Title III, Superfund Amendment and Reauthorization Act, 1986) and Section 6607 of the Pollution Prevention Act. These laws are intended to increase public awareness and access to information concerning the presence and release of toxic chemicals present in the community. The Act is often referred to as the Toxic Release Inventory (TRI) and requires certain type facilities to meet specific criteria including those facilities with specified Standard Industrial Classification code designations and provide annual reports to state and federal agencies regarding releases of listed toxic and hazardous chemicals to the environment.

The proposed Leeville Project falls within Standard Industrial Code 1041, and Newmont is subsequently required to submit Chemical release Reporting Forms (Form R or A) for listed chemicals that exceed designated thresholds to Environmental Protection Agency (EPA) and State of Nevada.

Forms R or A are required for all Section 313 chemicals and compounds which exceed annual threshold levels for “manufacturing” (25,000 pounds), “processing” (25,000 pounds), and “otherwise used” (10,000 pounds) classifications. In reporting year 2001, companies must report to a 10 pound threshold level for Persistent Bioaccumulative Toxins, which includes lead and mercury.

Airborne emissions of elements and compounds associated with processing Leeville Project ore would be emitted as a portion of the total emissions from Newmont’s South Operations Area. A discussion of elements and compounds released to the environment is included in *Chapter 4 – Air Quality.*

HUMAN HEALTH AND SAFETY

Human health and safety at the Leeville Project would be regulated by the federal Mine Safety and Health Act of 1977 (MSHA), which sets

TABLE 2-6
Leeville Project Health and Safety Training Programs

Course	Personnel	Frequency	Duration	Instruction
New-hire Training	All new hires exposed to mine hazards	Once	24 hours	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards First aid Explosives Toxic materials
Task Training	Employees assigned to new work tasks	Before new assignments	Variable	Task-specific health and safety procedures Supervised practice in assigned work tasks in nonproductive duty
Refresher Training	All employees who received new-hire training	Yearly	8 hours	Required health and safety standards Transportation controls Communication systems Escapeways, emergency evacuations Fire warning Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

Source: Newmont 1997a.

mandatory safety and health standards for surface metal and nonmetal mines. The purpose of these health and safety standards is the protection of life, promotion of health and safety, and prevention of accidents. MSHA regulations are codified under 30 CFR Subchapter N, Part 56. Employees at the Leeville Project area would be required by Newmont to receive training as outlined in **Table 2-6.**

EMPLOYMENT

The Leeville Project would employ approximately 400 people. Most of the work force for the Leeville Project would be from existing mine-related work forces in the Carlin Trend. The construction work force for the Leeville Project would be approximately 300 people during the initial year of construction and decrease to approximately 50 employees during the final year of construction. Construction and development are expected to require approximately 48 months to complete.

RECLAMATION

Reclamation activities for the Leeville Project are designed to achieve post-mining land uses consistent with BLM's Resource Management Plan for the Elko District. Reclamation is intended to return disturbed land to a level of productivity comparable to pre-mining levels associated with adjacent land. Post-mining land uses include wildlife habitat, livestock grazing, dispersed recreation, and mineral exploration and development.

Short-term reclamation goals would be to stabilize disturbed areas and protect disturbed and adjacent undisturbed areas from unnecessary or undue degradation. Long-term reclamation goals would be to ensure public safety, stabilize the site, and establish a productive vegetative community consistent with post-mining land uses.

Reclamation activities would include shaft closure and regrading the waste rock disposal facility, removal of structures after cessation of operations, regrading disturbed areas (including roads), drainage control, well closure (e.g. dewatering wells, piezometers, etc.), removal and regrading stockpile areas, replacement of salvaged soil, revegetation, and reclamation monitoring. The reclamation schedule would encompass the period between cessation of mining through revegetation. Reclamation activities are expected to be initiated in 2020 and completed approximately 8 years after mining ceases. Reclamation would take place concurrent with operations where possible. The proposed post-reclamation topography for the Leeville Project is shown on **Figure 2-8**, and cross sections through selected portions of the reclaimed area are presented on **Figure 2-9**. A Closure Plan meeting State of Nevada requirements (NRS 519A.010 to 519A.280 and NAC 519A.010 to 519A.415) must be filed with NDEP two years prior to closure of the mine.

Soil Salvage

As the mine shaft areas, haul and access roads, stockpile sites, and waste rock disposal areas are developed; Newmont would recover available topsoil for future use in reclaiming disturbed areas. Topsoil recovery depths would be determined during salvage operations by reclamation specialists. Topsoil would be salvaged and transported to stockpiles using scrapers, wheel dozers, track dozers, haul trucks, and loaders. One topsoil stockpile would be constructed immediately south of the Refractory Ore Stockpile. Topsoil salvage depths are summarized in Chapter 3, *Soils*.

Grading Disturbed Areas

Prior to replacing soil or a suitable growth medium, facility sites would be graded to the slope configurations shown on **Figure 2-9**. Grading is designed to create a stable post-mining configuration for disturbed areas, establish effective drainage to minimize erosion, and protect surface water resources. To the extent practicable, grading would blend disturbed areas with the surrounding terrain. Angular features, including tops and edges of waste rock disposal facilities, would be rounded.

Rock faces associated with construction of mine facilities would remain after cessation of operations and reclamation. Acceptable fill material would not be available for reclamation of these rock faces and topography of the areas associated with the rock faces does not allow for stable placement of material to backfill these rock exposures.

Prior to initiating the proposed reclamation vegetation plan, Newmont would evaluate topsoil replacement depths for north and south exposures. Soil replacement depths would vary according to location and soil type. The variety of replacement depths would provide different vegetation mosaics on reclaimed areas.

The regraded surface would be ripped where necessary prior to placement of topsoil. Ripping would reduce compaction, provide a uniform seed bed, and establish a bond between the seed and topsoil.

Revegetation

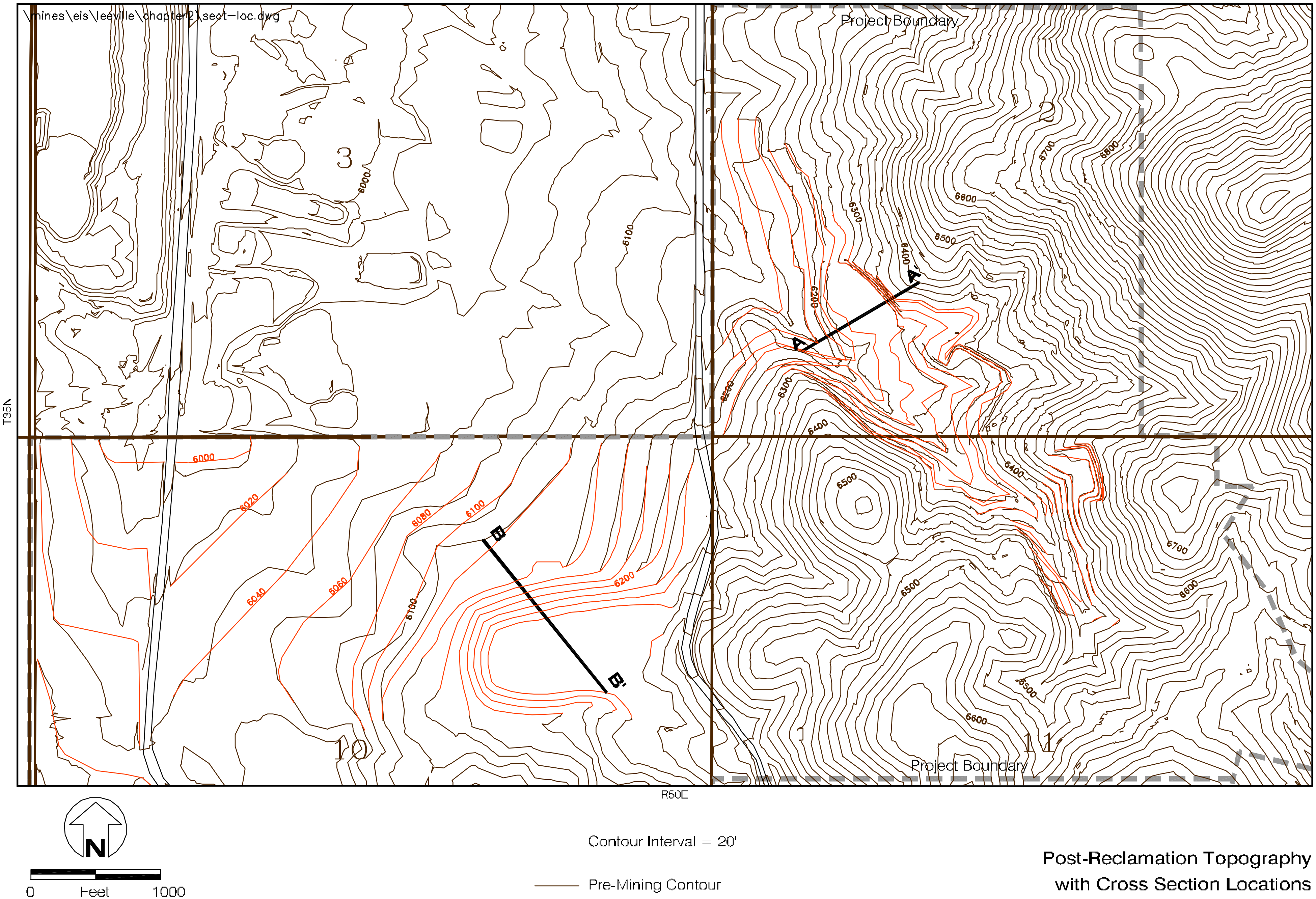
Newmont's revegetation program goals are to stabilize reclaimed areas, ensure public safety, and establish a productive vegetative community based on the applicable land use plan and designated post-mining land uses (Newmont 1997a). **Table 2-7** is the proposed seed list for reclamation in the Leeville Project area. Actual seed mixes to be used during reclamation would be selected from the plant list in **Table 2-7** depending on availability or cost, and would be applied at a rate of approximately 15 pounds pure live seed (PLS) per acre. Modifications in the seed list, application rates, cultivation methods, and techniques could occur based on success of concurrent reclamation. Changes and/or adjustments to seed mixtures and application rates would be developed through consultation with and approval by BLM and NDEP. Seedlings may be substituted for seeds.

The seed mix selected would represent a Reclaimed Desired Plant Community and the mix would be appropriate for each ecological site description in the study area.

TABLE 2-7
Plant List for Leeville Project Area

Grasses	
Bluebunch wheatgrass	***Agropyron spicatum***
Thickspike wheatgrass	***Agropyron dasystachyum***
Streambank wheatgrass	***Agropyron riparium***
Western wheatgrass	***Agropyron smithii***
Sandberg bluegrass	***Poa sandbergii***
Great Basin wildrye	***Elymus cinereus***
Indian ricegrass	***Oryzopsis hymenoides***
Webber ricegrass	***Oryzopsis webberi***
Idaho fescue	***Festuca idahoensis***
Green needlegrass	***Stipa viridula***
Bottlebrush squirreltail	***Sytantion hystrix***
Crested wheatgrass	***Agropyron cristatum***
Sheep fescue	***Festuca ovina***
Slender wheatgrass	***Agropyron trachycaulum***
Canby bluegrass	***Poa canbyi***
Sand dropseed	***Sporabolus cryptandrus***
Alkali sacaton	***Sporabolus airoides***
Forbs	
Yellow sweetclover	***Melilotus officinalis***
Cicer milkvetch	***Astragalus cicer***
Northern sweetvetch	***Hedysarum boreale***
Buckwheat	***Eriogonum***
Common sainfoin	***Onobrychis viciaefolia***
White sweetclover	***Melilotus alba***
Alfalfa	***Medicago sativa***
Annual ryegrass	***Lolium perenne multiflorum***
Barley	***Hordeum***
Western Yarrow	***Achillea millefolium***
Blue flax	***Linum lewisii***
Gooseberry leaf globemallow	***Sphaeralcea grossulariaefolia***
Small burnet	***Sanguisorba minor***
Scarlet globemallow	***Sphaeralcea coccinea***
Desert globemallow	***Sphaeralcea ambigua***
Arrowleaf balsamroot	***Balsamhoriza saggitata***
Palmer penstemon	***Penstemon palmeri***
Shrubs	
Wyoming big sagebrush	***Artemisia tridentata var. tridentata, wyomingensis***
Antelope bitterbrush	***Purshia tridentata***
Serviceberry	***Amelanchier (alnifolia) utahensis***
Snowbrush	***Ceanothus spp.***
Winterfat	***Ceratoides lanata***
Chokecherry	***Prunus virginiana***
Black sagebrush	***Artemisia nova***
Shadscale	***Atriplex confertifolia***
Fourwing saltbush	***Atriplex canescens***
Prostrate kochia	***Kochia prostrata***
Rubber rabbitbrush	***Chrysothamnus nauseosus***
Mormon tea	***Ephedra (nevadaensis) (viridis)***
Currant	***Ribes spp.***
Woods rose	***Rosa woodsii***
Snowberry	***Symphoricarpos spp.***

Source: Newmont 1997a.



Contour Interval = 20'

Pre-Mining Contour

Post-Reclamation Countour

Post-Reclamation Topography with Cross Section Locations

Leeville Project

FIGURE 2-8

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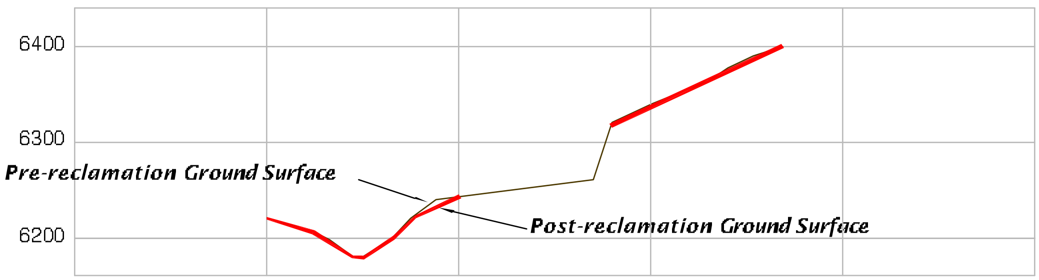
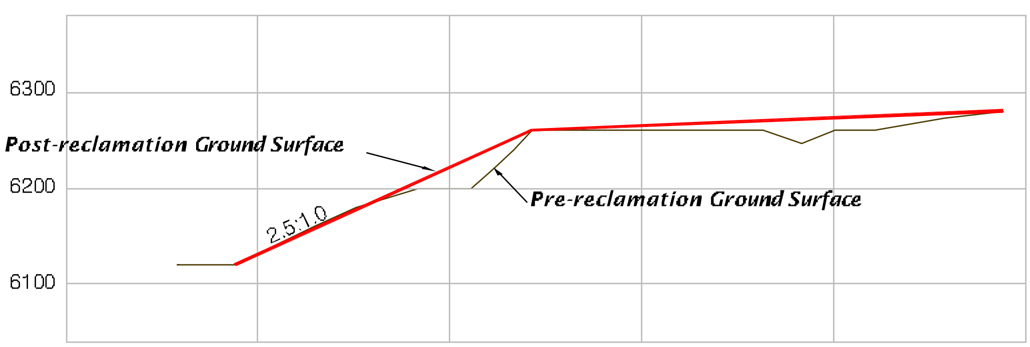


SECTION A-A'

For Cross Section Location See Figure 2-8

Horiz. Scale: 1'=500'



SECTION B-B'

For Cross Section Location See Figure 2-8

Horiz. Scale: 1'=500'

Post-Reclamation Cross Sections

Leeville Project

FIGURE 2-9

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Concurrent Reclamation

Newmont has been conducting concurrent reclamation at the Leeville Project area addressing disturbances resulting from exploration activities. These disturbances include drill roads, trenches, sumps, and drill pads. As various facilities reach the end of their period of use, Newmont would initiate reclamation activities concurrent with ongoing mining operations.

Underground Mine Shafts

The system of five shafts would be reclaimed at ground surface in a manner to preserve them for potential future use while safe-guarding humans and wildlife. Potential future uses may include extraction of deposits that are sub-economic at the time of reclamation but may become economic in the future, or exploration and development of undiscovered deposits in the area.

The shafts would be sealed using steel, pre-stressed beams encapsulated in a 4-foot thick concrete slab constructed at the top of the shaft. The slab would be constructed on steel beams that span the collar of the shaft to prevent collapse and would overlap the shaft collar by approximately 2-feet on each edge. The concrete shaft lining would prevent animals from burrowing into shaft walls. The shaft lining thickness would vary up to 48 inches where poor ground conditions occur. **Figure 2-10** is a typical cross section showing design of the shaft capping system. **Figure 2-11** is a plan view of the shaft closure design to be used at the Leeville Project. As shown on **Figure 2-10**, the shaft collar would be backfilled with approximately 16-feet of uncompacted waste rock placed on top of the concrete cap. A mound of compacted clay would be placed over the backfill resulting in an approximate 8-foot high mound as measured from ground surface. Topsoil would be placed on top of the compacted clay to provide a growth medium for revegetation.

Earthen berms would be constructed around the remaining rock faces and signs posted to warn of potential hazards associated with the rock faces. Abandoned boreholes would be plugged in a manner similar to exploration drill holes in compliance with NAC 534. The lower portion would be filled with pelletized bentonite or bentonite slurry and the upper portion with concrete.

Waste Rock Disposal Facility

The waste rock disposal facility associated with the Leeville Project would be regraded to a final reclaimed slope angle of 2.5H:1.0V as shown on **Figure 2-9**. Remaining benches combined with the bench face angles would result in an overall slope angle of 2.5H:1.0V for the 120-foot height of the facility. Grading would be done to minimize rill erosion, facilitate reclamation activities (seeding, mulching), and provide a surface that would support vegetation. The top of the waste rock disposal facility and the remaining benches would be graded to promote runoff and limit ponding of precipitation and snowmelt (**Figure 2-9**).

Upon completion of grading, topsoil or other suitable growth medium would be redistributed to an average depth of 24 inches over the waste rock. The waste rock would be regraded, ripped (to relieve compaction from mining equipment), and seeded according to the reclamation plan (Newmont 1997a).

PAG waste rock produced during mining operations would be placed on a low permeability base. If acid-base accounting tests indicate the total mixture of waste rock produced from the Leeville Project is acid-generating, the waste rock facility would be encapsulated. Encapsulation of the waste rock facility would be as described in the Waste Rock Disposal Facilities section of this Chapter, and in accordance with the Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1997a).

Ore and Backfill Stockpiles

Refractory ore stockpiles and backfill stockpiles would be removed at the end of mine life and the stockpile areas reclaimed. **Figure 2-8** shows the reclaimed topography associated with the stockpile sites.

Roads

Roads associated with the Leeville Project would be reclaimed concurrently with cessation of operations in each individual area. Roads remaining at the end of mining operations would be reclaimed when no longer needed for reclamation and access.

Haul roads associated with waste rock disposal areas would be reclaimed concurrently with closure of the disposal site. Haul roads not located on the waste rock disposal site would be reclaimed by regrading to provide proper drainage, topsoil replacement, and revegetation. The reclaimed roads would be regraded, to the extent practical, to reestablish the original topography and drainage of the site and to control erosion. Culverts would be removed and natural drainage reestablished.

Exploration roads, drill pads, sumps, and trenches would be reclaimed in conjunction with ongoing operations. Exploration roads and drill pads are bladed or formed using a dozer. The disturbed soil material forms the roadbed or drill pad. Upon reclamation the disturbed soil material is recontoured or regraded onto the disturbed area to blend with surrounding topography. Trenches are excavated with a dozer or backhoe. Trenches are backfilled and regraded to conform to the surrounding topography and drainages are reestablished.

Ancillary Facilities

At the end of the Leeville Project mine life, the explosives magazine, ancillary buildings, water supply pipeline, and other mine support structures with significant salvage value would be dismantled for salvage or used for other operations in the area. Concrete foundations would be broken up to the extent possible and buried a minimum of 5-feet below ground surface. Access drifts and excavations for underground facilities would not be backfilled.

Unused explosives would be returned to the vendor or used at other mine sites in adjacent areas. Non-salvageable material including scrap building materials and equipment would be buried onsite in the landfill or disposed of offsite in accordance with federal and state regulations. Hazardous material would be decontaminated and disposed of at approved landfills.

The water pipeline would be reclaimed by plugging the pipe at both ends and allowing the pipe to remain buried. The canal would be backfilled, regraded, and revegetated to match the surrounding ground surface.

Monitoring/Evaluation of Reclamation Success

Newmont in cooperation with BLM and NDEP, would evaluate the status of vegetative growth during three full growing seasons following completion of regrading, resoiling, and planting. Final bond release may be considered at that time. Interim progress of reclamation at the Leeville Project area would be monitored as requested by the agencies. Water monitoring, as described in the Resource Monitoring section of this chapter, would also be used in evaluating reclamation success.

PROJECT ALTERNATIVES

This section describes alternatives to the Proposed Action (Leeville Project), including the No Action Alternative and Alternatives Considered but Eliminated from Detailed Analysis. Alternatives selected by BLM for consideration in this EIS are based on potential impacts or issues associated with the Proposed Action, including those identified by the public during the scoping process. BLM is required to analyze environ-mental effects resulting from the Proposed Action and to identify reasonable alternatives that would mitigate, minimize or eliminate potential impacts. BLM is also required to analyze the No Action Alternative and describe the environmental consequences that would result if the Proposed Action is not implemented.

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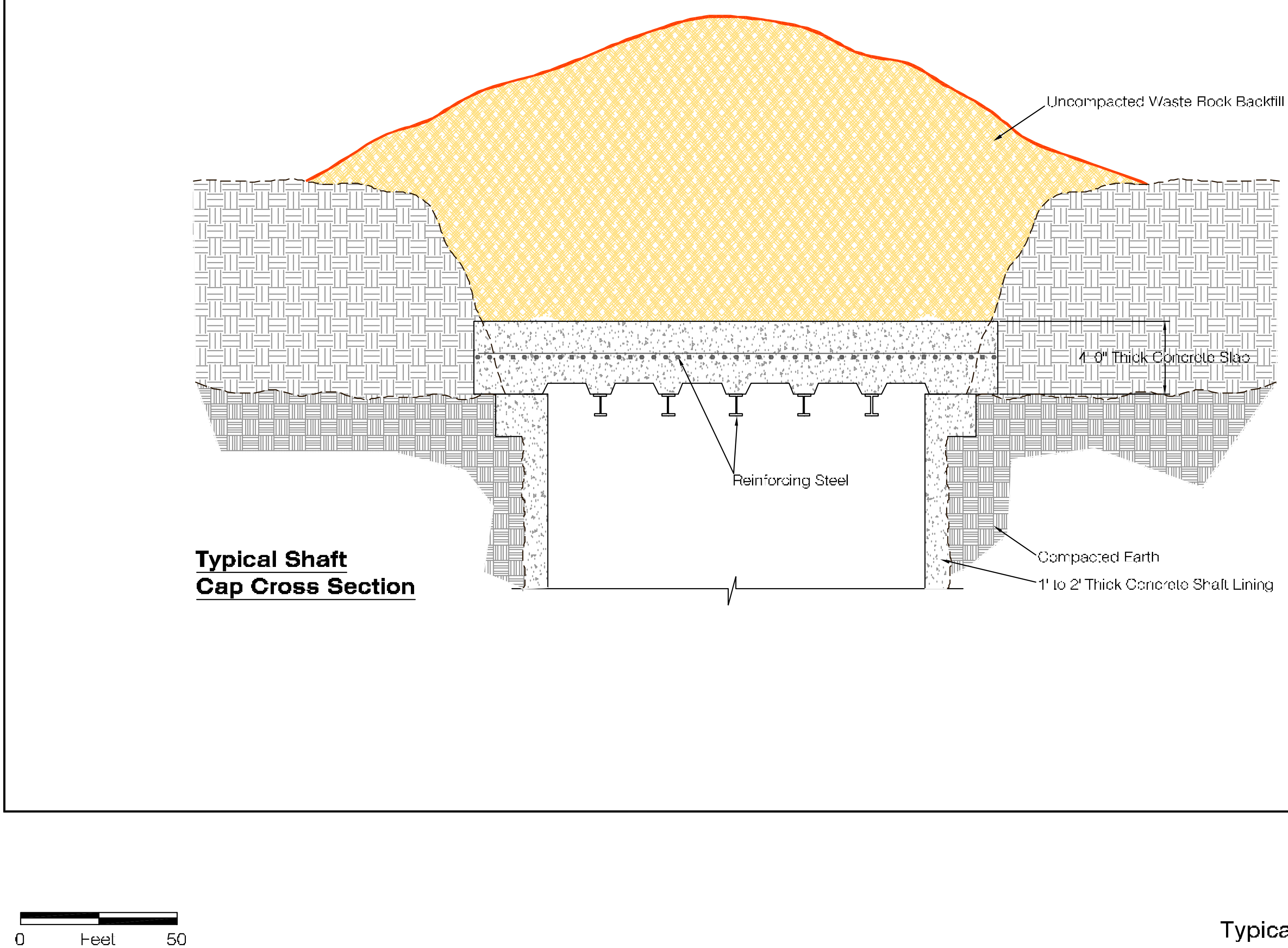

Typical Shaft Cap Cross Section
Leeville Project
FIGURE 2-10

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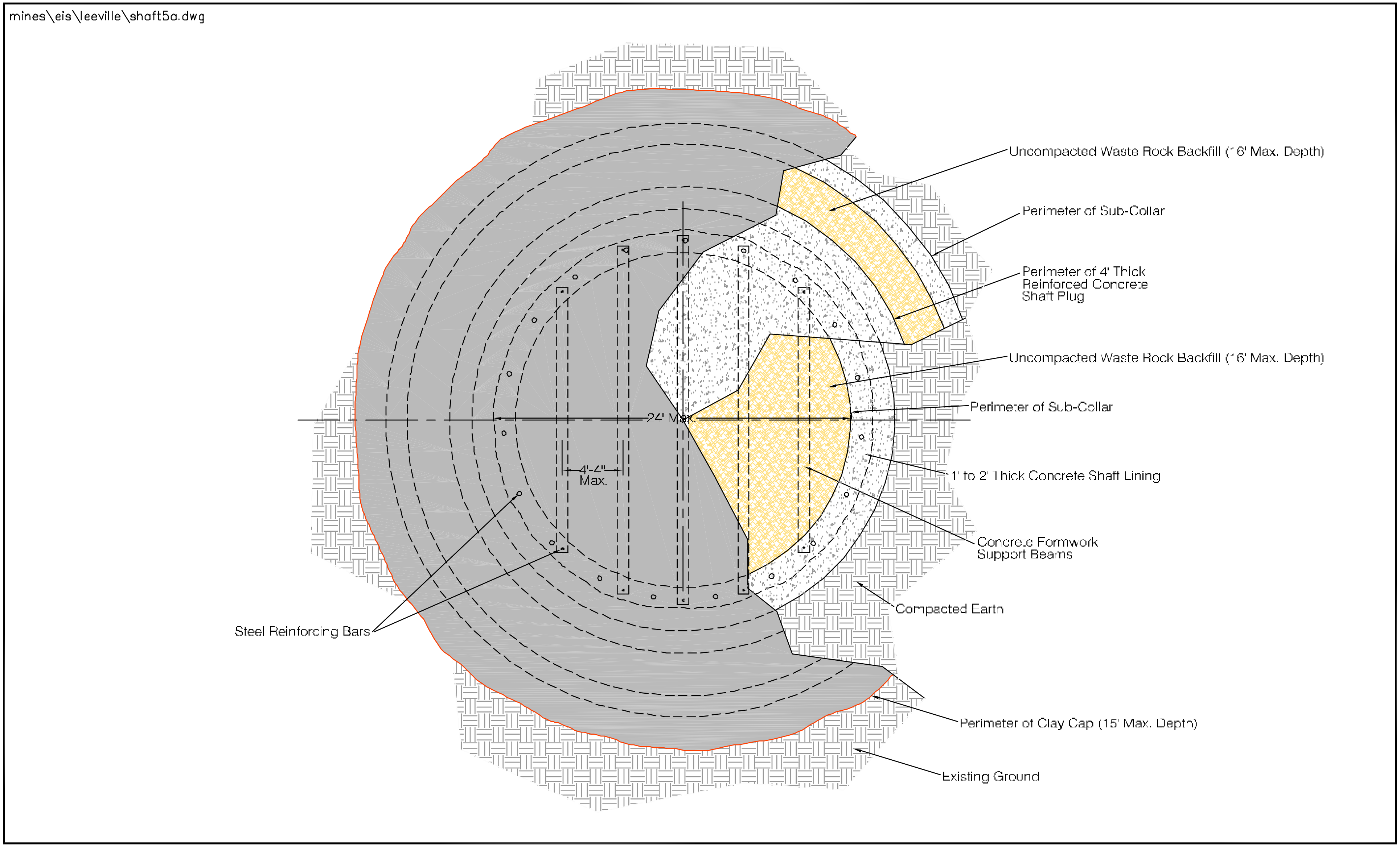

Conceptual Shaft Cap Plan
Leeville Project
FIGURE 2-11

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Major components of the proposed mine development, their respective functions, and potential environmental effects resulting from implementation of these activities are con-sidered in development of alternatives. Potential mitigation measures are described in Chapter 4 for each resource. Other alternatives were considered early in the review process. These alternatives were eliminated because they were either technically or economically infeasible, or they provided no environmental advantage over the Proposed Action.

ALTERNATIVES CONSIDERED IN DETAIL

Four alternatives are described in this section of the EIS: **Alternative A –** Eliminate Canal Portion of Water Discharge Pipeline System; **Alternative B** – Backfill Shafts; **Alternative C –** Relocate Waste Rock Disposal Facility and Refractory Ore Stockpile; and **No Action Alternative**.

Alternative A – Eliminate Canal Portion of Water Discharge Pipeline System

Issue: A canal, 5,700 feet in length, would be constructed as the last segment of the proposed pipeline system. The canal would begin near the western edge of Section 1, T35N, R49E, and continue approximately 5,700 feet to its terminus at Barrick's existing cooling canal located near the TS Ranch Reservoir (**Figure 2-7**). An open canal may have potentially significant impacts on wildlife.

Alternative A would incorporate all components of the Proposed Action but would eliminate the canal. Alternative A would require Newmont to extend the pipeline to the confluence with Barrick's cooling canal.

Alternative B – Backfill Shafts

Issue: Newmont proposes to cover the pro-duction and ventilation shafts associated with the Leeville Project with a reinforced concrete cover once the shafts are no longer needed to support activities in the Project area. Because concrete shaft covers would not have an indefinite life span, complete backfill of the shafts is evaluated as an option that would provide an effective, long-term closure of the shafts.

Alternative B would include implementation of all components described in the Proposed Action and would require Newmont to backfill the production and ventilation shafts associated with the Leeville Project. Based on maximum design specifications for the five shafts included in the Proposed Action, approximately 166,000 cubic yards of material would be needed to backfill the shafts. Newmont would use waste rock generated from the mining operation as backfill for the shafts. Waste rock would be recovered from the waste rock disposal facility. Removal of 166,000 cubic yards of waste rock for use as backfill would require approximately 1,500 trips using 170-ton haul trucks and would not result in a reduction in surface disturbance for the waste rock disposal facility.

Backfilling the shafts would eliminate the need for reinforced concrete closures Newmont has proposed for the shafts. The uppermost portion of the shaft would be backfilled with overburden and then topsoiled to support vegetation.

Backfill and closure of shafts would occur at such time that Newmont decides that no further access or activity is required in the Leeville Mine area. Newmont would maintain a closure bond for backfilling the shafts in an amount estab-lished by the agencies to ensure closure under this alternative. This bond would be periodically reviewed and adjusted to reflect current costs of backfilling. Upon satisfactory closure by Newmont, the bond would be released by BLM and NDEP.

Alternative C – Relocate Waste Rock Disposal Facility and Refractory Ore Stockpile

Issue: Under the Proposed Action, construction and operation of Newmont's proposed waste rock disposal facility and refractory ore stockpile would disturb approximately 118 acres of land in Section 10, T35N, R50E. Placement of these facilities on currently disturbed land in Section 3, T35N, R50E would result in reducing the disturbance associated with the Leeville Project by 118 acres. Disturbance acres associated with these facilities would be relocated onto currently disturbed private land owned by Newmont. **Figure 2-12** is a layout of Alternative

C. Total new disturbance associated with the Leeville Mine Project would be 368 acres (335 public, 33 private) under Alternative C.

Alternative C would incorporate all components of the Proposed Action but would require Newmont to locate the waste rock disposal facility and refractory ore stockpile in Section 3, T3N, R50E. Placement of these mine facilities would not result in new disturbance in Section 3.

Existing mining operations located in Section 3 are associated with Newmont's North Area Leach (NAL) facilities. The area in Section 3 that would be used for the proposed Leeville Mine waste rock disposal facility and refractory ore stockpile have been previously used as a Refractory Ore Stockpile facility for Newmont's North Area Operations. The existing stockpile site is built in accordance with Newmont's Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1997a).

Runoff from waste rock and refractory ore placed on the NAL Refractory Ore Stockpile site would infiltrate onto an underlying compacted clay liner system and drain to an existing collection system associated with the NAL Refractory Ore Stockpile facility. The existing NAL water control ditch system would be used to contain surface water run-on/run-off.

Reclamation of the Leeville Mine waste rock disposal facility and refractory ore stockpile would be consistent with the approved reclamation plan for the NAL Refractory Ore Stockpile facility. This reclamation plan includes regrading the surface of the facility, placement of growth media, and seeding.

No Action Alternative

Under the No Action Alternative, the Proposed Action would not be approved. Newmont would not be authorized to develop defined ore reserves, construct ancillary mine facilities, place waste rock in the disposal facility, or construct the dewatering system discharge pipeline on public land. Potential impacts predicted to result from development of the Project would not be realized.

FEATURES COMMON TO PROPOSED ACTION AND ALTERNATIVES

The following components of Newmont's proposed Plan of Operations for the Leeville Project are common to the Proposed Action and Alternatives:

- Mining the Leeville Project ore deposits;
- Constructing and operating a waste rock disposal facility;
- Placing refractory ore in temporary stockpiles;
- Transporting ore from the Leeville Project site and/or refractory ore stockpile via the North-South Haul Road to Newmont's South Operations Area for processing;
- Rerouting an existing Sierra Pacific Power Company power line;
- Constructing ancillary facilities, including office complex, perimeter fence, production and ventilation shafts, equipment maintenance facility, explosives magazine, soil stockpiles, septic field, water distribution facilities, dewatering system discharge pipeline, and fueling station;
- Continuing geologic evaluations; and
- Reclamation activities, including closure and regrading of the waste rock disposal facility, removal of structures after cessation of operations, regrading of disturbed areas (including roads), drainage control, well closure, removal and regrading of stockpile areas, replacement of salvaged soil, revegetation, and reclamation monitoring.

Agency Preferred Alternative

The agency preferred alternative is Alternative A – Eliminate Canal Portion of Water Discharge Pipeline System; Alternative B – Backfill Shafts: and, Alternative C – Relocation of the Waste Rock Disposal Facility and Refractory Ore Stockpile.

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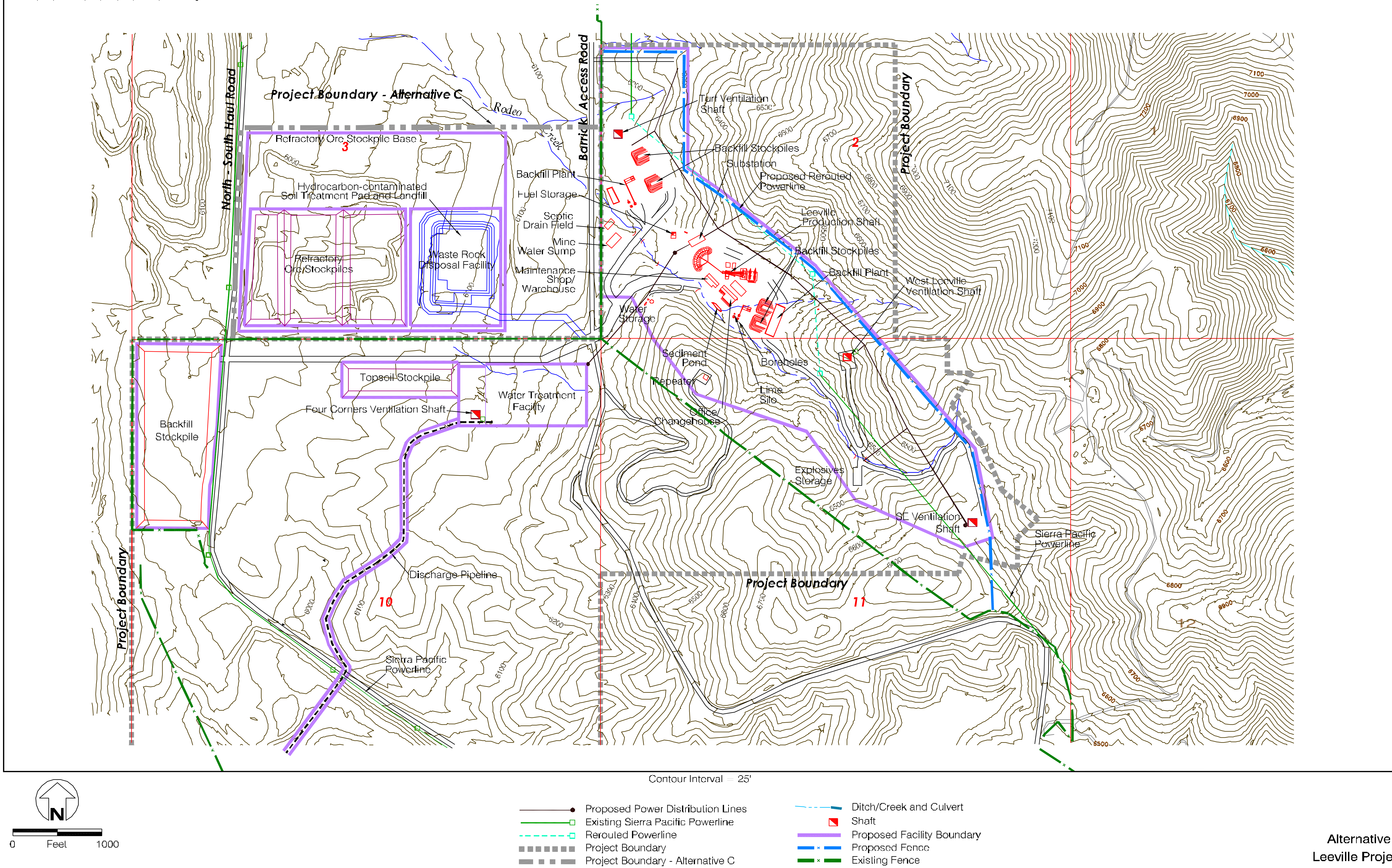

Alternative C
Leeville Project
FIGURE 2-12

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MITIGATION AND MONITORING MEASURES

This section contains descriptions of mitigation and monitoring measures included in Newmont's proposed Plan of Operations for the Leeville Project. Mitigation and monitoring measures described below apply to the Proposed Action and Alternatives:

- All surface disturbance would be reclaimed in accordance with applicable federal, state, and local regulations;
- Topsoil would be salvaged from proposed disturbance areas. Soil material would be stockpiled for future use or directly hauled to regraded areas and placed in preparation of final surface reclamation;
- Most mined-out stopes would be backfilled with development waste rock or cemented rock fill consisting of aggregate and cement mixtures;
- Surface water control ditches would be constructed as necessary around surface facilities, stockpiles, and waste rock disposal facility to control surface water run-on/run-off;
- Encapsulation of potentially acid-generating waste rock would be completed in accordance with the Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1997a);
- Shaft walls would be grouted to prevent inflow of groundwater. During construction of the shafts and for the life of the mine any localized inflow of groundwater into the shaft would be pumped to the surface, treated for hydrocarbon removal and used for dust suppression and mine development.
- Surface water and groundwater monitoring would continue until federal and state agencies determine it is no longer necessary. The monitoring program would be evaluated and revised annually based on water quality and quantity data, and updated numerical model results;
- Vegetative growth would be evaluated during three growing seasons following completion of regrading, resoiling, and seeding; and
- Revegetated areas would remain fenced to protect from livestock grazing. Seedlings may be used to establish shrub vegetation.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

This section describes alternatives to the Proposed Action that were eliminated from further review in the EIS. These alternatives were identified during the public scoping process or by BLM during review and analysis of the Proposed Action. These alternatives were considered technically infeasible, unreasonable, provided no advantage over the Proposed Action, or would not meet the purpose and need of the Proposed Action.

Alternative Discharge Outfall for Leeville Dewatering System

This alternative would incorporate all components of the Proposed Action, and would require Newmont to construct a pipeline to connect the Leeville Project dewatering system to Newmont's water treatment and cooling complex located at Maggie Creek near Newmont's Gold Quarry Mine.

A pipeline terminating at Newmont's Gold Quarry water treatment and cooling complex would be more than 7 miles longer than the proposed pipeline. The alternative pipeline would disturb 104 acres compared to 46 acres under the Proposed Action. The longer pipeline would cross State Highway 766 and possibly Maggie Creek twice in the "lower narrows" section. The pipeline for the Proposed Action would not cross any major roadways or perennial drainages. This alternative would have no advantage compared to the Proposed Action or Alternative A.

Grouting Underground Mine Workings to Reduce Dewatering Discharge

This alternative would include all components of the Proposed Action, and would require Newmont to implement a grouting program to reduce the rate of groundwater inflow to underground mine workings. This would be accomplished by drilling numerous, closely spaced boreholes to depths below the base of the underground workings. Grouting compound would be injected into boreholes to seal water-transmitting fractures and joints. The net effect of grouting underground workings would be that less water would need to be pumped from the aquifer to reduce groundwater inflow to underground mining operations. Since less water may need to be removed, the potential exists that Newmont could eliminate the need for a pipeline to discharge excess groundwater, or could reduce the size of the pipeline necessary to convey discharge water off-site. The overall capacity of the mine dewatering system and the quantity of water needing treatment could also be reduced under this alternative.

BLM has determined that a site-wide grouting program is not a reasonable alternative for the proposed Leeville Project. State-of-practice drilling and grouting technologies are such that accurate placement of grout at the desired locations would not be possible. In addition, the grout curtain could be jeopardized by stresses induced by normal mining practices and seismic activity. This would result in an unacceptable degree of risk to human safety (Herbert 1998).